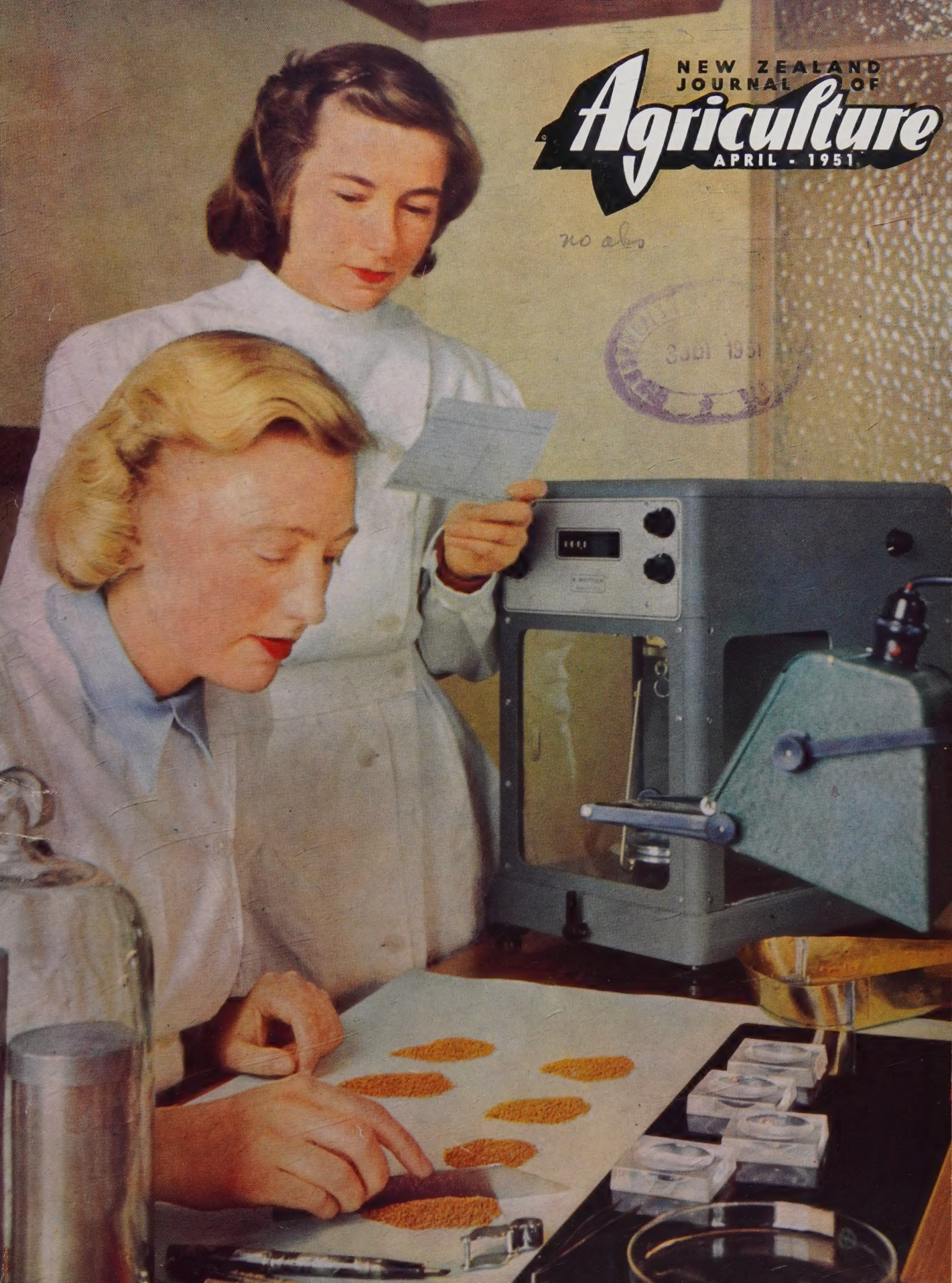
NEW ZEALAND
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APRIL - 1951

Cooper News

FARM BULLETIN published by COOPER, McDOUGALL & ROBERTSON (N.Z.) LTD.
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No. 17 PUBLISHED EVERY SECOND MONTH April, 1951

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Minister of Agriculture.

This Month's Cover

Testing of seeds has been done in New Zealand for 40 years, but in the last 20 years the work has increased enormously and today about 50,000 samples a year are handled at the Department of Agriculture's Seed-testing Station at Palmerston North. This month's cover, which has been reproduced from a colour photograph by Sparrow Industrial Pictures Ltd., shows two officers engaged in seed-testing work. The value of seed can be determined only by careful testing, and the certificates covering purity and germination tests which are issued by the station give buyers in New Zealand and overseas an assurance of quality in the lines reported on.

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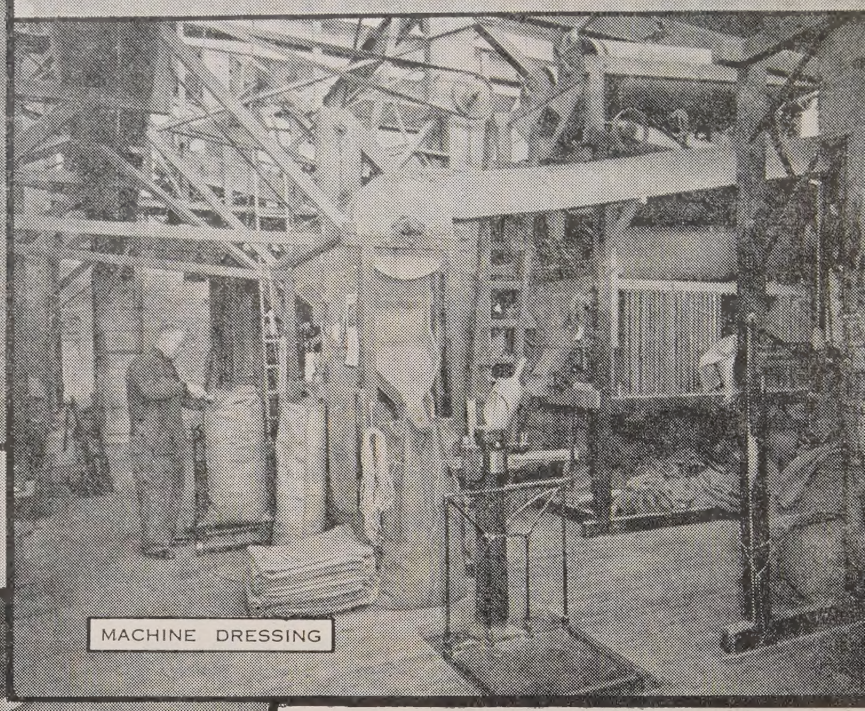
REGISTERED AT THE G.P.O., WELLINGTON, AS A MAGAZINE.

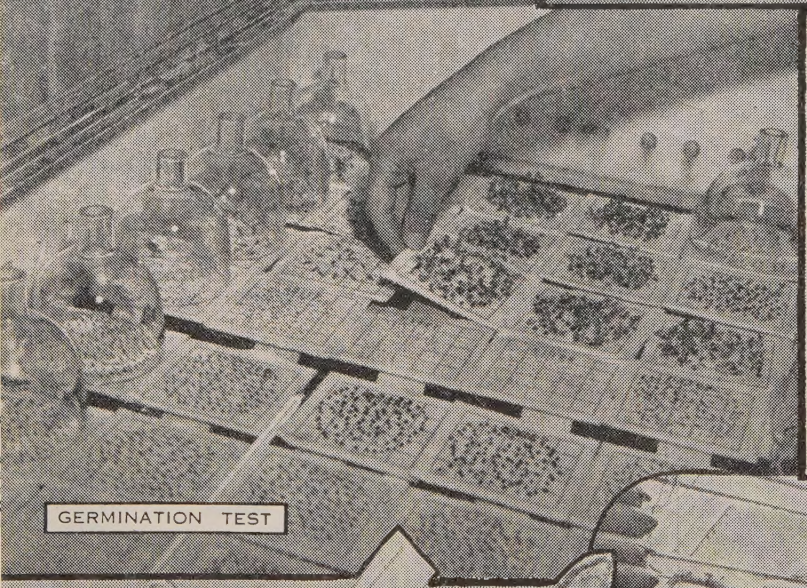
THE SMALL SEEDS INDUSTRY

DETERMINING READINESS OF CROP FOR HARVEST

SINGLE-PLANT SELECTIONS



MACHINE DRESSING



GERMINATION TEST

New Zealand's total export seed trade today is valued at more than £2,000,000 per annum, but it is only fortuitously that the strains of grass and clover seed under certification meet the needs of overseas countries, as the strains have been selected for conditions in New Zealand. The role of the seed certification scheme in the Dominion's agriculture is as an aid in lifting the production of animal foodstuffs to the highest level through good seed.

DRAWING THE SAMPLE

SEED READY FOR EXPORT

Agricultural Efficiency Depends on Good Pasture Seed

TO a country such as New Zealand, the economy of which depends largely on the products of its pastures, the growing of seeds for the establishment and renewal of those pastures is of national importance. To the seed producer the harvest provides an appreciable source of income, and the overseas funds of the country are aided materially each year by the credits from seed exports. These benefits can be measured in figures, but the real value of the seed industry must remain a subject of conjecture. I am certain, however, that farm production would not be at its present high level were not grass and clover seeds of reliable strain, tested for purity and germination, available to the farmer who wishes to improve the carrying capacity of his land.

In the last quarter-century very rapid advances have been made in our knowledge of seeds and in the application of that knowledge to farming. Before that some progressive farmers, without a factual basis, felt that seed from one district gave a better result than that from another. Their feelings were substantiated when strains of pasture plants came under scientific investigation and wide differences in type within a species were discovered.

Departmental officers recall such farmers stating that their only reason for not renewing pasture was their fear of obtaining a sward inferior to the one already established. Today that fear has gone. Seed of known strain, purity, and germination is available to every farmer. Faulty seed has been eliminated as one of the risks he must run in pasture establishment. Most of the others can be overcome by proper attention to cultivation, sowing, and after-management.

Strain, Purity, and Germination

What are the factors in good grass and clover seed?

Strain is most important. In nature good and poor strains have developed in all our pasture plants. Science has capitalised on this and has further improved the good strains. Strain cannot be determined by an inspection of the seed, but the Department's scheme of seed certification gives the buyer protection on this score. Certified seed is seed of approved strain.

Purity of seed is perhaps not as important as the types of impurities present in the line. A trace of a harmful weed seed is of far more significance than 1 per cent. of broken straw. A little ryegrass seed in cocksfoot is unimportant for pasture establishment, but is very serious where seed production is intended.

To know the germination of the seed is important, but low-germinating seed need not necessarily be avoided. If the interim germination of the line is high in relation to the final germination, the living seeds have high vigour and a heavier sowing will compensate for their being proportionately fewer than in a high-germinating line. If the interim germination is low in comparison with the final germination, the seed is lacking in vigour and adverse conditions after sowing may bring about a strike failure. The germination potential of a line of seed can deteriorate during storage, and a recent test of the line is therefore necessary.

Education, not Regulation

The Department of Agriculture and myself are both interested in improving pasture production and to this end are anxious to give every assistance to the seed industry. There is no Seeds Act on the Statutes Book to regulate sales of seed in New Zealand, but a policy of education can be of more positive assistance than regulation.

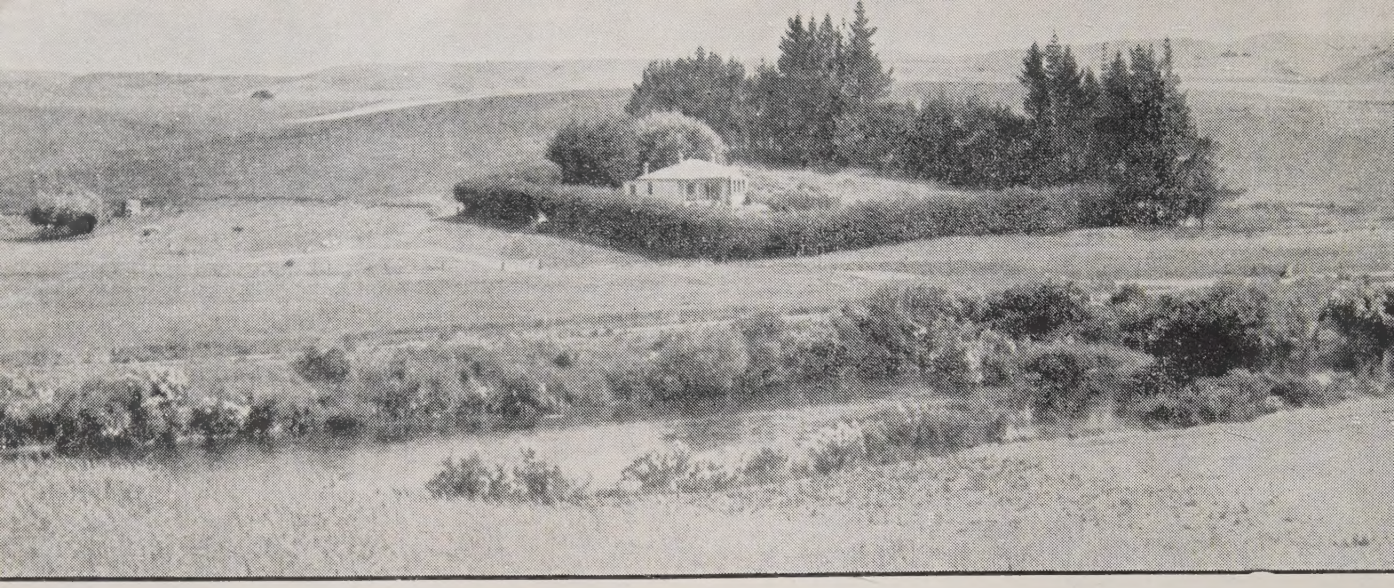
The Department of Agriculture operates an independent seed-certification scheme aimed at identifying lines of seed of approved strains. The scheme is voluntary and depends for its success on the co-operation of farmer, merchant, and the Department.

Similarly, an independent seed-testing station operated by the Department tests samples for both purity and germination and issues detailed certificates of analysis based on the results. Seed testing also is voluntary, but the fact that 50,000 samples a year are tested is evidence of its wide adoption.

In addition the Department maintains an advisory service to provide farmers with up-to-date information about such subjects as seed growing and harvesting, pasture establishment and management, and seed mixtures.

I am very happy to be associated with this voluntary plan to improve our seed knowledge, as I am convinced that a greater appreciation of pasture seeds and their efficient incorporation in a farming programme will pay handsome dividends not only in greater agricultural production but also in increased fertility of our farmlands.

K. J. HOLYOAKE, Minister of Agriculture.



Development of Browntop Country

ON the rolling country of Otago and Southland and also occurring spasmodically along the foothills of the Southern Alps are areas of land known familiarly as "browntop country". This term is used to describe the partially improved downlands, relatively low in fertility, cold and wet in winter, but moderately dry in summer, and fairly high in lime requirement, which, because of these conditions, tend to revert rapidly to a pure association of browntop (*Agrostis tenuis*). In this article J. G. Richards, Instructor in Agriculture, Department of Agriculture, Balclutha, using South Otago as the example, traces the vegetative changes that have taken place on browntop country from the days of early settlement to the present.

IN the early days of settlement of South Otago there were two types of vegetation. On the higher rainfall areas there was bush whereas in the 30-40in. rainfall areas tussock grassland was found. Gone are the huge areas of waving tussock, and today it is these areas which form the mixed arable farms of South Otago and Southland.

The early utilisation of these tussock grasslands was by wide-range grazing of sheep and cattle, but as the population grew there arose an increased demand for grain. Consequently in 1852 many of the large grazing blocks were subdivided and arable farming increased, accentuated by the huge population increase associated with the rush to the goldfields. With continuous cropping a marked decline of fertility occurred on many farms, but with the introduction of refrigeration attention was turned to livestock and a more active interest developed in pasture land.

Many of the pasture species introduced were of poor type, lacking vigour and persistency, but conditions were favourable for browntop, which quickly became the dominant species over a large area in Clutha and Bruce Counties and further south in Southland and Wallace Counties. Even today first-class pastures subjected to poor management will quickly revert to browntop-dominant swards.

As a major constituent of the sward browntop is a low-producing grass and under low-fertility conditions it quickly assumes dominance in the south. When high prices rule for browntop seed there is an incentive for browntop seed production, which merely involves grazing with dry sheep in late autumn and winter, closing for seed in spring, and allowing seed to be direct headed or sometimes stripped, often by contract, in autumn. This type of extensive farming is possible with the minimum amount of farm improvements and entails little effort. The practising of it in the past has tended to produce an uninteresting, treeless landscape and has brought browntop country into a certain amount of disrepute. It is possible, however, to establish and maintain good pastures on this land, as is being demonstrated by many farmers.

Browntop Regions of Today

The largest area of browntop at present is confined to South Otago, and other fairly large areas are found in Southland and Wallace Counties. The browntop country of South Otago embraces some 800 square miles, mainly on the southern bank of the Clutha River, extending up the river some 40 miles from its mouth and being on the average 20 miles wide.

In Southland County fairly extensive areas extend south from Gore to Edendale on the eastern foothills of the Hokonuis, and again south of Wyndham in the Otara and Fortrose districts. In Wallace County the largest area surrounds Nightcaps, and further areas are situated in the Eastern Bush district.

Soils of the Browntop Country

On the majority of soils in South Otago the topsoil is sufficient in depth to stand ploughing to 6in. or 7in., and a freshly ploughed paddock does not usually show any brown patches of disturbed subsoil. A typical soil profile shows 6in. of grey silt loam (rusty fleck, firm crumb structure, slightly compacted), 10in. mottled grey and yellowish-brown loam, "ironstone gravel" (moderately compacted), 2in. of very gravelly layer of "ironstone" concretions, and 8in. of brownish-yellow silty clay loam (strongly compacted), all underlain by yellowish silt loam (slight to moderately compacted).

Fluctuations in moisture and nitrogen, caused by the presence of the compacted zone some 15 to 18in. below the surface of the ground, have a most marked effect on the growth of crops such as linseed and linen flax. This may be due to waterlogging in the upper layers in a wet season and, conversely, to drought in a dry season, both conditions being due to the impervious layer. Pastures are not affected to any great extent by this compaction of the subsoil.

In the main the browntop-dominant area is of rolling down and foothill country, although in some cases windblown material from the riverbeds has helped to build up the fertility, notably on the north side of the Clutha River in the Greenfield district. Most of the browntop areas have a high lime requirement, and until this is supplied, clover growth is both scanty and fleeting.

History of Farming

The first settlers of South Otago defined their runs to the Waste Lands Board and were issued with depasturing licences which were valid for 14 years unless the land were required for closer settlement. The rental consisted of an annual fee of 1d. per sheep carried.

After the early gold rushes in the 1860's and as a result of the high prices ruling for cereals, many of the original runs or portions of them were requisitioned and a period of grain growing began. Extensive cropping and loss of fertility became associated with more or less temporary pastures grown to restore a little of the virgin fertility. Without the application of lime and fertilisers and with continuous cropping of white crops, yields decreased rapidly, as was to be expected.

Need for Better Pastures

However, in the late 1880's, with the development of refrigeration, the need for better pasture land became apparent, and extensive cropping was reduced. English grasses and clover were sown, but under the conditions prevailing were only of moderate persistency. At that stage it became apparent that browntop was ideally suited to the environment, and the grass was widely sown and became dominant over a large area.

From the early 1930's seed production of browntop assumed some importance and even today some thousands of acres are harvested, but the present trend is to replace browntop pastures with better grasses having greater fattening qualities and the ability to increase carrying capacity. Where previously the chief products were wool and mutton today the emphasis is on wool and fat lambs. The change has been accompanied by a decrease in the size of farms to about 500 to 600 acres, provision of adequate drainage, extensive liming, the use of good seeds mixtures, and the topdressing of the sown pastures with phosphates.

Importance of Cropping

Today on the average farm on this country only the acreage necessary to produce winter feed and feed for lamb fattening is broken up annually. The crops consist mainly of swedes, turnips, rape, and kale. Occasionally cash crops of wheat, oats, or linseed may be taken and in favourable seasons grass seed areas may be harvested. With the advent of the farm tractor there is no necessity to grow the large acreage of oats needed for horse teams of bygone days.

A review of the cropping statistics of Clutha County over 30 years reveals a large decrease in the oat crop, an increase in fattening crops such as rape and kale, a decrease in the acreage of winter feed such as swedes and turnips, due to better crops being produced, and more than a three-fold increase in the area cut for hay since 1922.

Present-day Practices

For successful results both in crops and pasture, soil drainage must be adequate. The presence of rust or ironstone nodules at from 8 to 10in. below ground level indicates impeded drainage, and this condition is frequently found on browntop country. The simplest method of draining this land and that generally adopted is mole drainage; owing to the compacted subsoil moles hold well and last for 15 to 20 years. On the rolling country good use can be made of gullies for outlets, but on flatter country tile drains are most effective. Tile drains together with manuka (fascine) drains are more costly to establish, but their effective life is longer. Open drains are used to a limited extent, but are confined mainly to swampy areas.

In the development of browntop country initial treatment can be varied, depending on the stage of the browntop sward. Where the browntop is sodbound and the fertility low the ground may be swamp ploughed in summer to a depth of 8 to 10in. and left fallow till the following spring. If the browntop has been grazed and the area is of reasonable fertility, the fallow may be dispensed with and the land ploughed later in the autumn. A third method may be adopted in areas of low rainfall, where the turf may be surface worked with a cultivator in the summer and autumn before deep ploughing about May.

Whatever ploughing methods are adopted it is usual to ridge swedes in November as the first crop. Some two months before ridging the crop it is usual to apply at least 1 ton per acre of carbonate of lime; lime is sown after the first double discing, which in some cases is preceded by rolling on the furrow.

Cultivation before ridging usually consists of 3 double discings each followed by harrowing. Rolling may not be necessary after each harrowing, but should precede ridging. The swede crop is ridged with 3cwt. per acre of reverted superphosphate, and 12 to 16oz. of seed are sown. The crop is saddle harrowed and inter-cultivated twice. Machine thinning follows the first scuffling. The crop is fed off in breaks between May and August and the ridges are disced down as the breaks are used and the ground is harrowed.

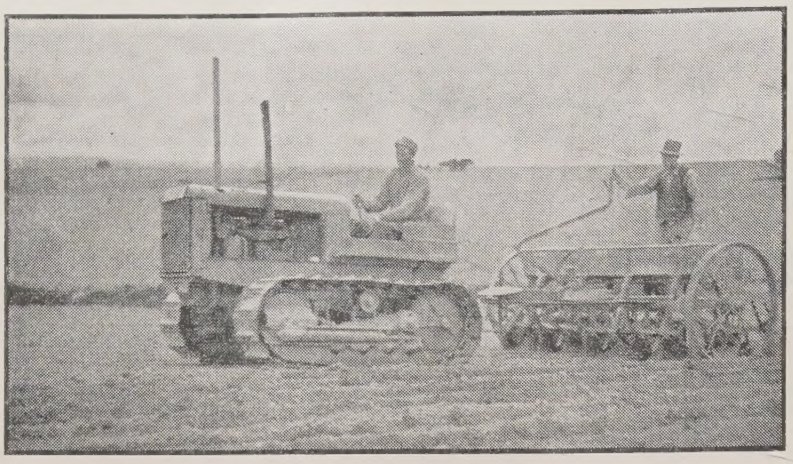
After the swede crop has been fed off it is not usual to plough, as discing followed by harrowing each time secures a good seed-bed for grass. The land is generally free from weeds and if ploughing is avoided, no unrotted turf is brought to the surface; in addition the manure from stock which have fed off the crop is retained in the topsoil.

While there is browntop remaining on the farm, grass is usually established following the swede crop, a nurse crop of rape or oats often being grown with the grass. Oats are usually sown at the end of September or early in October and rape slightly later and often in two sowings at intervals of 2 to 3 weeks to afford a longer grazing period for fattening stock.

The preparation of the ground for grass is normally four double discings each followed by harrowing. If the land has set due to feeding off under bad weather conditions, it may be necessary to clodcrush or roll it before each harrowing, except possibly after the final discing. Before the final harrowing at least 1 ton of carbonate of lime is applied and the ground harrowed and rolled. It is usual to apply 2 to 3 tons of carbonate of lime while the ground is up, that is, in the two applications referred to. If oats are sown as a nurse crop, 2½ to 3 bushels per acre are drilled with 2cwt. per acre of superphosphate. The ground is harrowed and rolled and the grass

Left—Typical ridges on which browntop soon becomes dominant if management practices are poor. Right—Two-tooth Southdown ewes on good ryegrass-white clover pasture at Clinton.

DEVELOPMENT OF BROWNTOP COUNTRY



Sowing swedes in ridges. The crop is grown annually by farmers on browntop land, as it fits in admirably with the rotations.

seed broadcast behind the roller, to which the grass harrows are also attached. A final rolling completes the operation, as consolidation is most necessary for successful establishment of grass seed. Alternatively if rape is used, 2lb. of seed is drilled through every second coulter of the drill with 2 to 3cwt. of reverted superphosphate, and the ground harrowed and rolled. Operations for the grass seed follow similar lines as already detailed.

Grass seed mixtures recommended are as follows:—

	A	B
	lb.	lb.
Perennial ryegrass ..	20	20
Short-rotation ryegrass ..	10	10
Cocksfoot	6	—
White clover	3	3
Montgomery red clover ..	2	2
Timothy	—	5
	41	40

The two mixtures quoted allow a choice of cocksfoot or timothy. Cocksfoot is better suited to the lighter-rainfall areas and farms on which rotational grazing is practised while timothy is suited to the higher-rainfall districts and farms where set stocking is practised from lambing until weaning. Some farmers may include both species in their mixtures with beneficial results. Certified seed should be used and is procurable with all species mentioned.

The subsequent management of the pastures should provide for an annual topdressing of 2cwt. per acre of reverted superphosphate and an application of 10cwt. per acre of carbonate of lime every second year. With good management the effective life of the pastures should be 10 to 15 years compared to the effective life of pastures sown 20 years ago of some 3 to 4 years. The average sheep farm on the ridge country contains 540 acres of which 100 is unploughable and should carry 800 ewes and 250 hoggets. Thirty acres would be ploughed from grass, 30 acres cropped for the second time, and a similar area sown to grass. This is the usual cropping programme after the initial breaking in of the old browntop.

If seed production of perennial ryegrass is required, no short-rotation ryegrass or Montgomery red clover should be sown. However, due to the prevalence of blind seed disease little perennial ryegrass is harvested. After the pasture is 3 to 4 years old it may be possible to harvest white clover seed by closing the field at the beginning of December, providing ample feed is available on the remainder of the farm. Generally, however, some hay is required and any surplus feed is conserved for this purpose. In Clutha County alone the average area hayed each year during the period 1940-49 was 3865 acres, compared with an average of 1062 acres each year during the period 1920-29.

Change in Livestock

The gradual development of browntop country has been accompanied by an increase in the number of fat lambs killed at the local freezing works at Finegand. Whereas in 1928, 85,237 lambs were killed 20 years later killings increased to 336,469. Over a longer period, however, a decrease in the number of wethers killed is noticeable, as, in 1918, 36,693 wethers were slaughtered compared to 1381 in 1948.

The change from dry to wet stock farming naturally has been accompanied by a large increase in carrying capacity. The Romney ewe has been of increasing importance and the Southdown ram has proved very suitable for producing the desired fat lamb carcass from this ewe. However, on many farms the Romney ram is still used and sufficient ewe lambs retained for replacements, in some cases the surplus being sold as ewe hoggets or 2-tooths.

An indication of the increased usage of lime and phosphate on the browntop country of South Otago is given by deliveries of these materials at the railway stations of Waiwera, Clinton, and Waipahi which in 1950 were 35,689 tons of lime and 5246 tons of fertiliser, compared with 8685 tons of lime and 3353 tons of fertiliser in 1935.

The use of phosphate has not increased to the same extent as has the use of lime, but on this type of land attention must be given to liming before any great response is received from phosphates.

Increase in Carrying Capacity

Examples of increases in carrying capacity are easy to obtain, as most farmers have participated in the development of portions of their farms. One farm of 3000 acres at Warepa which previously carried 2800 ewes and now carries 4500 ewes can be cited as typical of the progress being made by the majority of the farmers in the district. A case of the rapid improvement that is possible can also be quoted. In February, 1946, a farmer purchased a block of 1082 acres in the Clydevale district, the revenue from which depended previously on browntop seed production. By December, 1950, the crop and pasture position on the farm was as follows: 24 acres of 4-year grass, 75 acres of 3-year grass, 130 acres of 2-year grass, 75 acres of 1-year-old grass, and 100 acres of newly sown rape and grass.

Thirty-five acres were in ridged swedes on the first furrow after browntop and another 40 acres were in ridged swedes following oats, following swedes, following browntop; 20 acres were sown in Gartons Onward oats and 8 acres in Cross 7 wheat.

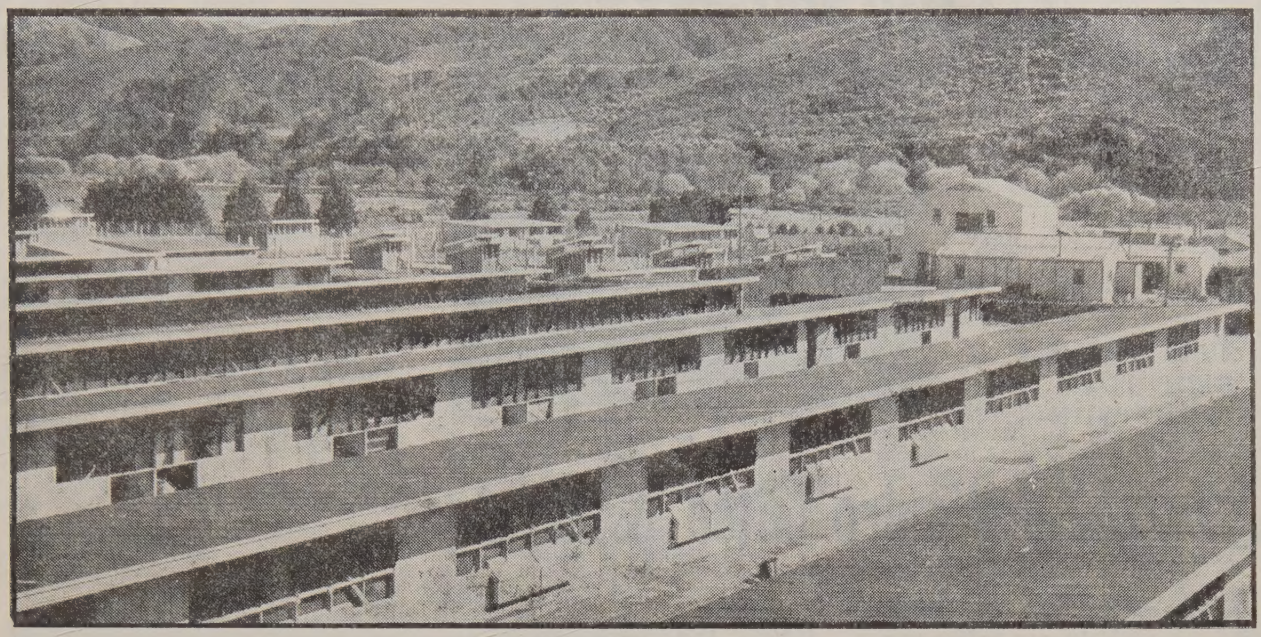
This winter the remaining 173 acres, which in March were harvested for browntop, will be ploughed and sown out in swedes.

Stock carried during 1950 were 700 ewes and 350 hoggets and at the March, 1951, sales an extra 250 2-tooths were purchased to build the ewe flock up to about 950, which will be carried on 780 acres, the other 302 acres having been disposed of to a neighbour.

That improved carrying capacity can be secured without ploughing cannot be gainsaid, but the improvement obtained is very much less than that secured with the assistance of the plough. By the liming of browntop pastures it is possible to increase the palatability of those areas, encouraging better grazing by stock and gradually raising the fertility through the extra stock manure. After a few years it will be found that clover—mainly suckling clover—will appear, and later this is followed by volunteer white clover. When white clover comes in the stage has been reached where phosphate may be beneficially applied. Country developed along these lines may eventually carry 2 sheep per acre and possibly at best may produce 50 per cent. of lambs fat off their mothers. However, it is more probable that the sale of 2-tooth ewes and full-mouth ewes would be the main source of income.

Though improvement has been effected on the browntop country, the improvement has been relatively slow. Capital is necessary, but the advent of farm mechanisation has speeded up development. The district is not particularly well served as regards lime supplies and farmers have to depend largely on supplies from North Otago and, when available, from Southland. Bulk distribution of lime is now being used in the district and undoubtedly this will cheapen application. Progress is likely to be maintained and prospects are bright.

Trial Shows Need for Vitamin A in Diet of Laying Pullets



THOUGH most commercial poultry farmers are aware of the desirability of feeding greenfeed to laying birds, and officers of the Department of Agriculture are constantly stressing this point, a feeding trial designed to show the necessity for supplying adequate vitamin A to laying pullets was carried out at the Department's Poultry Demonstration Plant, Upper Hutt, during 1950. Results of this trial are given by F. C. Bobby, Superintendent, Poultry Industry, Department of Agriculture, Wellington, with the recommendation that they be studied carefully by all poultry producers who run their laying birds intensively.

THIS trial was designed with a full realisation that the value of vitamin A for poultry of all ages has been investigated extensively overseas. The objective of this trial was to demonstrate in a manner which would be easily understood by poultry producers the value of vitamin A in the feeding of laying pullets and the relative values of different sources of this vitamin. Until comparatively recently vitamin A has been supplied to laying birds in New Zealand by the feeding of greenfeed. It has been observed, first, that some poultry producers are haphazard in the feeding of greenfeed, particularly in winter or during dry weather when it is difficult to maintain adequate supplies; and, second, that the quantity and value of this greenfeed as a source of vitamin A during winter and dry weather are doubtful. In addition, it was considered desirable to demonstrate the value of a fish oil rich in vitamin A as a means of supplementing greenfeed, more particularly during winter and when either the quantity of greenfeed available or its quality was considered doubtful.

Influence of Vitamin A

The effect of vitamin A on the health of birds and their resistance to disease has been established. An absence or inadequacy of vitamin A is likely to result in birds developing "nutritional roup", or avitaminosis, the typical symptoms of which are swollen eyes and white pustules in the mouth. Greenfeed or a fish oil rich in vitamin A can be fed to prevent the occurrence of this disease, but the greenfeed must be young and of good quality; old and fibrous material has lost its value as a vitamin A-rich food.

Basis of Trial

The trial was started on March 22, 1950, and continued for 11 periods of 28 days, or 44 weeks, ending on January 23, 1951. Black Orpington-White Leghorn crossbred pullets were used, each pen containing 45 pullets selected on a random sample basis. They were housed intensively in pens 12ft. x 16ft., allowing about 4¼ sq. ft. of floor space per bird. All birds were treated with carbon tetrachloride for worms before being placed in their pens.

The four pens were fed as follows:—

Pen 1: Basic ration plus greenfeed and oil.

Pen 2: Basic ration plus greenfeed.

Pen 3: Basic ration plus oil.

Pen 4 (control pen): Basic ration with no supplementary food.

Basic Ration

Mash and grain comprised the basic ration, with oyster shell and hard metal grit always available. The grain was 3lb. of wheat to 1lb. of oats, and the constituents of the mash were:—

Bran	23lb.
Pollard	21lb.
Wheat meal	24lb.
Ground oats	7lb.
Maize meal	10lb.
Meat meal (60 per cent. protein)	13lb.
Common salt	1lb.
Oyster shell dust	1lb.
	100lb.

The grain was fed in the early morning and late afternoon and a wet mash at 10.30 a.m. Grain and mash were fed in approximately equal quantities.

Supplementary Foods

Fish oil containing 2000 international units per gramme of vitamin A was fed to Pens 1 and 3 at the rate of ¾ pint per 100lb. of mash, supplying 4500 units of vitamin A per 1lb. of total feed consumed—a quantity well above the amount recommended for laying birds by the National Research Council.

Silver beet, a greenfeed commonly fed to poultry, was supplied throughout the 44 weeks in Pens 1 and 2. This greenfeed was chopped and fed separately in troughs at 1 p.m. at a rate of not less than 3lb. per pen daily, or about 1oz. per bird. Successive sowings of silver beet ensured a regular supply of good-quality feed.

HEADING PHOTOGRAPH: The pens in the foreground of this section of the Poultry Demonstration Plant are those used in the vitamin A feeding trial.

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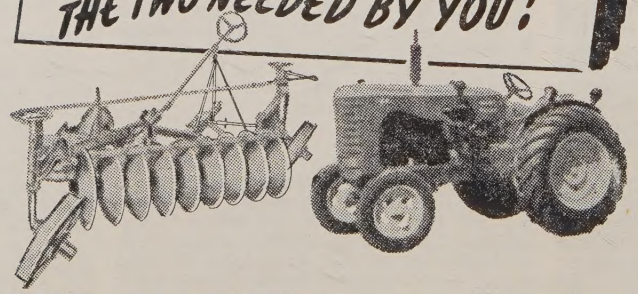

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TRIALS WITH VITAMIN A IN DIET OF LAYING POULTRY

Feeding and general management procedure conformed with good average commercial conditions. The pullets, being an average random sample taken from range, had had access to greenfeed and accordingly started with a normal reserve of vitamin A in their bodies.

Measurement of Results

The data collected for all groups were:—

Egg production, which affords the main basis for comparison between the four rations.

Food consumption, comparison of which with production gives a food-efficiency figure.

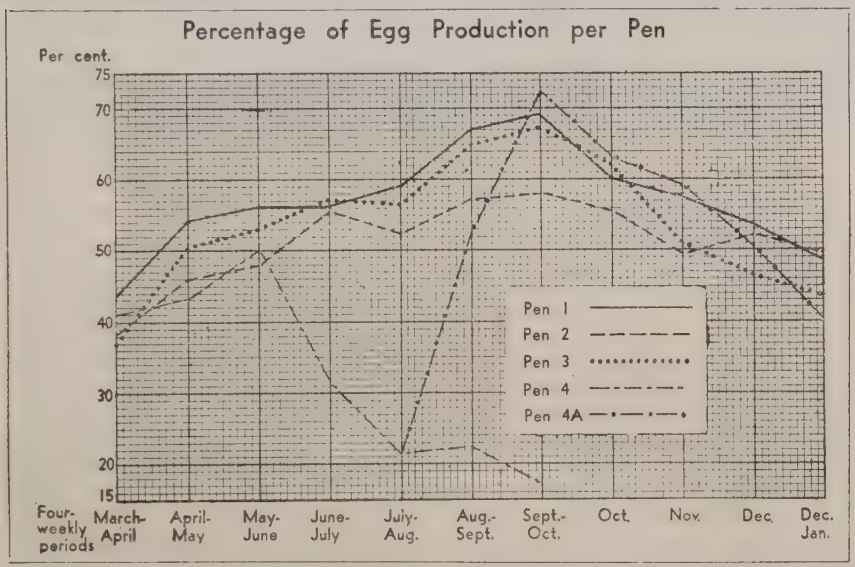
Mortality, all birds which died being subjected to post-mortem examination, mainly with the object of detecting any lesions of avitaminosis or nutritional roup; no culling was carried out.

Yolk colour, which was noted at intervals in eggs from each pen.

AVERAGE PERCENTAGE OF EGG PRODUCTION PER PEN

Four-weekly period	Pen 1 (greenfeed and oil)	Pen 2 (greenfeed)	Pen 3 (oil)	Pen 4 (control)	Pen 4A (oil)
March–April	43.8	38.4	36.9	41.8	
April–May	54.2	46.0	50.5	43.2	
May–June	56.3	48.1	53.1	50.2	
June–July	56.3	55.8	57.0	31.9	
July–August	59.0	52.7	56.7	21.6	
August–September	67.0	57.3	65.5	22.5	52.7
September–October	69.2	58.0	67.6	17.4	72.6
October	60.2	55.6	62.3		63.0
November	57.8	49.6	51.5		59.4
December	53.7	52.3	46.8		50.8
December–January	48.9	49.7	43.7		40.3

Pen 4A was given fish oil at the same level as Pen 3, and within 10 days egg production had more than doubled, continuing to increase until it was fully equivalent to that from Pens 1, 2, and 3. This established beyond doubt that the original collapse of Pen 4 was caused by a lack of vitamin A. Finally Pen 4 was discontinued, as the birds were all suffering from severe avitaminosis and were almost incapable of seeing their food because of swollen eyes.



Egg Production

The outstanding feature of the egg-production figures recorded in the two tables and the graph on this page is the sudden and heavy decline in egg production of Pen 4—the control pen which received no vitamin A-rich supplementary food. Production from this pen was normal and comparable to that of the others for 12 weeks, after which it declined rapidly. It is reasonable to assume that the birds had a reserve of vitamin A in their bodies when they were housed which sufficed for normal production for 12 weeks, at which point these reserves became exhausted.

After a further 2 months, production from Pen 4 had dropped to 20 per cent. At this point the pen, then consisting of 38 pullets (7 having died), was divided on a random sample basis into Pen 4 and Pen 4A. Pen 4 was continued as the control pen with no vitamin A-rich supplementary feed.

Pen 1, in which the birds received both greenfeed and oil, gave the best result—an average of 10 eggs per bird more than Pen 3, in which the birds received oil but no greenfeed. Pen 2, receiving only greenfeed, gave an average of 18 fewer eggs per bird than Pen 1 (oil and greenfeed) and 8 fewer eggs per bird than Pen 3 (oil only).

The graph shows that the significantly lower production of Pen 2 occurred at the end of winter, apparently indicating that the vitamin A content of the greenfeed had been lower during winter while growth was at a standstill. The quality of the silver beet deteriorated during winter, but it was considered an average-quality crop for that time of year.

Food Consumption

Total consumption of mash and grain per bird for the 44 weeks for Pens 1, 2, and 3 was as follows; Pen 4 was discontinued before the end of the trial:—

	Mash (lb.)	Grain (lb.)	Total (lb.)
Pen 1	39.7	50.9	90.6
Pen 2	36.7	45.2	81.9
Pen 3	38.9	45.8	84.7

The total weight of food consumed to produce 1 dozen eggs from each hen was: Pen 1, 6.16lb.; Pen 2, 6.27lb.; Pen 3, 6.13lb.

Mortality

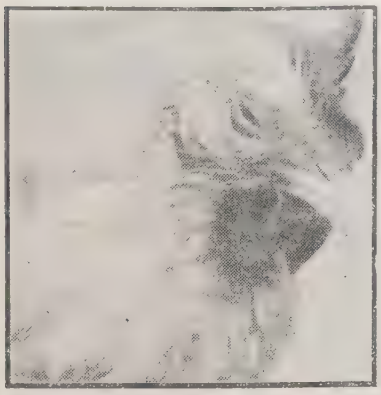
Losses by death in each pen were:—
Pen 1 .. 10 birds (22 per cent.)
Pen 2 .. 8 birds (17 per cent.)
Pen 3 .. 10 birds (22 per cent.)
Pen 4 .. 22 birds (48 per cent.)

The figures for Pens 1, 2, and 3 are of no relative importance, but of the 28 birds examined from these three pens none showed any indications of avitaminosis or nutritional roup. On the other hand, of the 22 birds examined from Pen 4, 18 were suffering from nutritional roup.

The birds severely affected by nutritional roup in Pen 4 which were not killed finally became nearly blind. They were then fed with silver beet, but no oil, and ultimately recovered completely. However, the number left was too small for their egg production to be recorded, though it increased after the birds received silver beet daily.

AVERAGE NUMBER OF EGGS PER BIRD

Four-weekly period	Pen 1 (greenfeed and oil)	Pen 2 (greenfeed)	Pen 3 (oil)	Pen 4 (control)	Pen 4A (oil)
March–April	12.3	10.8	10.3	11.7	
April–May	15.2	13.0	14.1	12.1	
May–June	15.8	13.5	14.9	14.1	
June–July	15.8	15.6	16.0	9.0	
July–August	16.5	14.8	15.9	6.0	
August–September	18.7	16.0	18.3	6.3	14.8
September–October	19.4	16.1	18.9	5.0	20.3
October	17.0	15.5	17.4		17.6
November	16.2	13.9	14.4		16.6
December	15.0	14.6	13.1		14.2
December–January	13.7	14.0	12.2		11.2
	175.6	157.8	165.5		



Above—A pullet from Pen 4, fed neither greenfeed nor oil, when the recording of these birds was ended because of their inability to see properly. Below—A healthy bird fed on a diet adequate in vitamin A.
[Fraser Niederer photo.

Yolk Colour

Eggs from Pens 1 and 2 were all normal in yolk colour, but those from Pen 3 (oil but no greenfeed) were significantly paler and not satisfactory as first-class market eggs.

After this test Pen 4 was fed with 5 per cent. of lucerne meal added to the mash; after a month the eggs produced still had pale yolks. The lucerne meal was increased to 10 per cent. and eggs again examined a month later; though the colour had improved slightly, the yolks were still too pale for satisfactory commercial eggs. The lucerne meal used was a typical sample normally offered to poultry producers. The purpose of adding the lucerne meal was to test whether yolk colour could be influenced when a fish oil is fed without a satisfactory supply of greenfeed.

Egg Returns and Feeding Costs

Results of a feeding trial are perhaps best appreciated by commercial egg producers if they are interpreted in terms of money. If the value of the eggs produced by birds in Pens 1, 2, and 3 and the cost of feeding the birds are computed, the margin of return over feeding costs can be expressed.

To obtain these figures the eggs produced have been valued as standard grade eggs at a winter price of 4s. and a summer price of 2s. 9d. a dozen. There is no evidence that vitamin A affects egg size, so eggs produced during the trial were not weighed. The prices chosen may not correspond exactly with those received by commercial producers.

The cost of feeding has been based on £20 per ton for mash, £17 10s. per ton for grain, and £1 2s. per gallon for fish oil. These figures approximate costs incurred at the Poultry Demonstration Plant.

In the following figures food is computed to the nearest pound and eggs to the nearest whole number:—

Cost of Food Consumed per Bird

	s.	d.
Pen 1 (greenfeed and oil)—		
40lb. of mash at 2.4d. per lb.	8	0
51lb. of grain at 2.13d. per lb.	9	0
Oil		10
	17	10
Pen 2 (greenfeed only)—		
37lb. of mash at 2.4d. per lb.	7	4
45lb. of grain at 2.13d. per lb.	7	11
	15	3
Pen 3 (oil only)—		
39lb. of mash at 2.4d. per lb.	7	9
46lb. of grain at 2.13d. per lb.	8	2
Oil		9½
	16	8½

Value of Eggs Produced per Bird

	£	s.	d.
Pen 1 (greenfeed and oil)—			
75 eggs at 4s. per doz. ..	1	5	0
100 eggs at 2s. 9d. per doz.	1	2	11
175 eggs	2	7	11
Pen 2 (greenfeed only)—			
67 eggs at 4s. per dozen ..	1	2	4
90 eggs at 2s. 9d. per dozen	1	0	7
157 eggs	2	2	11
Pen 3 (oil only)—			
71 eggs at 4s. per dozen ..	1	3	8
94 eggs at 2s. 9d. per dozen	1	1	6
165 eggs	2	5	2

The margins of return over feeding cost per bird for the three pens are:—

	£	s.	d.
Pen 1 (greenfeed and oil) ..	1	10	1
Pen 2 (greenfeed only) ..	1	7	8
Pen 3 (oil only)	1	8	5½

Pen 1 showed a margin of 2s. 5d. per bird greater than that from Pen 2; both received approximately equal quantities of greenfeed. (No attempt has been made to cost the greenfeed, as a satisfactory figure would be difficult to obtain.) Pen 3 gave a known advantage of 9½d. per bird over Pen 2, but Pen 2 received greenfeed which cost money to produce, and if this amount had been included, the margin in favour of Pen 3 would have been greater. If these margins of 2s. 5d. and 9½d. per bird are multiplied for a pen of 100 birds, the money advantages gained are impressive—£12 1s. 8d. and £3 19s. 2d.

Lessons from Trial

This trial demonstrated dramatically what losses in egg production can occur if pullets are managed intensively without either greenfeed or oil for longer than 3 months. Few poultry farmers may permit such an extreme lack of vitamin A in the diet of their laying birds, but some do give insufficient or poor-quality greenfeed. Then the birds receive insufficient vitamin A and production is lowered. The loss of eggs may not even be recognised, or more probably is attributed to some other factor.

The decrease in egg production from Pen 2 is considered to have been caused by a falling off in the quality of the silver beet during winter. A lowering of the quality of greenfeed during winter or dry summer weather can cause a fall in egg production. To that may be added a lowering of resistance to disease, but that point was not demonstrated in this trial.

Results from Pen 3, which depended on a fish oil for an adequate supply of vitamin A, show clearly that a suitable oil will protect the birds against avitaminosis and prevent a fall in egg production. Unfortunately, the value of oil for this purpose is lessened by the fact that the yolks of the eggs deteriorate in colour. Though the lucerne meal used failed to improve this factor, a poor-quality meal may have been the reason, and that could be overcome. However, when greenfeed is scarce a fish oil rich in vitamin A can be used to prevent a fall in egg production and ill health among the birds.

Pen 1 (greenfeed and oil) gave the highest average egg production, which supports the contention that good greenfeed is essential for best results from poultry and that oil should be regarded as an alternative only when greenfeed is scarce or of poor quality. Oil would appear to be a valuable adjunct to a layer's ration in combination with greenfeed during winter and in summer when the quality or quantity of greenfeed available is doubtful; its use could be discontinued at other times.

The effects, demonstrated by this trial, of vitamin A in the diet of laying birds under intensive conditions may be summarised as follows:—

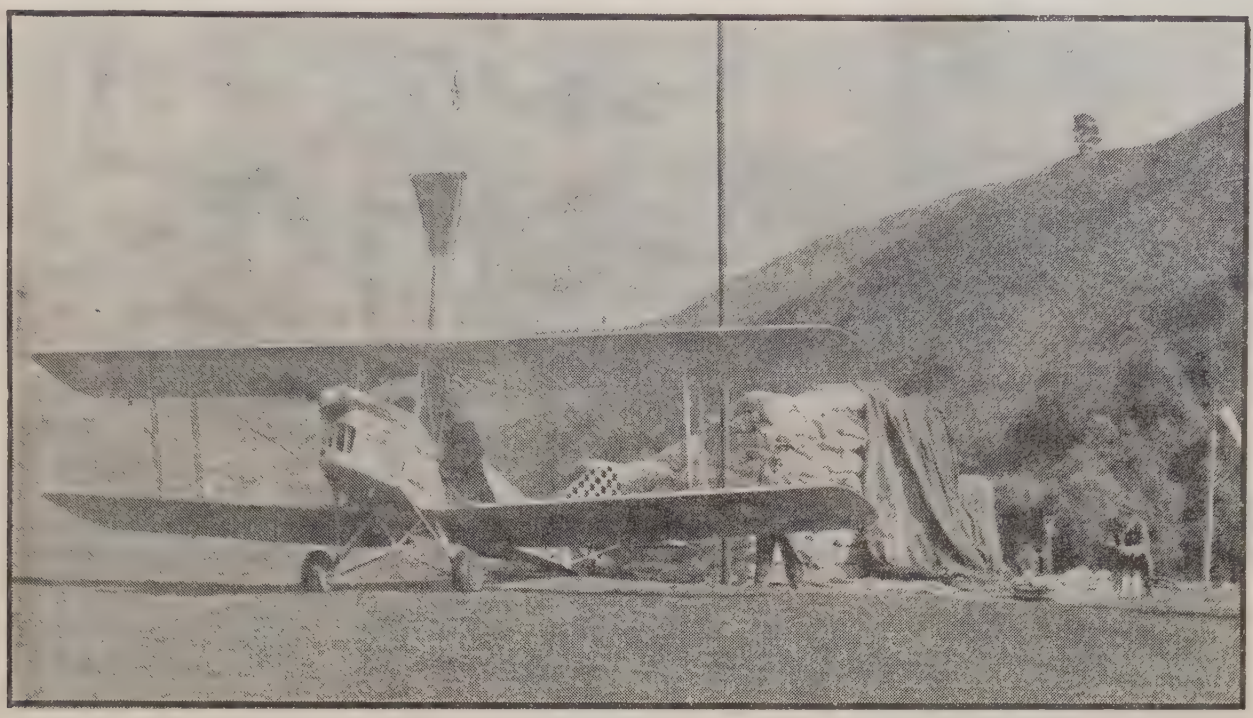
A complete absence of both greenfeed and a fish oil rich in vitamin A leads to a severe lowering of egg production and a loss of birds from avitaminosis A.

Where greenfeed alone is fed with a normal laying ration egg production may fall if the quality of the greenfeed deteriorates for an appreciable period.

A normal laying ration supplemented with a suitable fish oil, but without greenfeed, will sustain satisfactory egg production and health among the birds.

If oil only is used as a vitamin A supplement to a normal layer's ration, yolk colour may be expected to deteriorate.

Measuring Efficiency of Topdressing by Light Aircraft



By P. B. LYNCH, Crop Experimentalist, Department of Agriculture, Wellington.

TO the private operators of light aircraft, mainly Tiger Moths, must go the credit for the rapid development of aerial topdressing in New Zealand as a commercial proposition. Up to July 31, 1950, 20 private operators had distributed 11,600 tons of superphosphate on to about 116,000 acres. The initial stimulus to this achievement was no doubt provided by the official experiments, described in the April, 1950, issue of "The Journal of Agriculture", but great ingenuity and enterprise have been required to solve the numerous problems involved in translating the results of these experiments into commercial practice.

EFFICIENCY of distribution of fertilisers spread by light aircraft appears from observation to be very satisfactory in most cases. However, observational methods of judging distribution are liable to serious error, and it was considered desirable to undertake measurements of spread in a series of trials. Because light aircraft operate without the assistance of "ground control" the efficiency of fertiliser distribution from them must depend to a considerable degree on the skill of the pilot. This fact must be considered when the results of the trials are examined, and probably many commercial operations would give less efficient distributions than those which have been measured. To form some idea of this variation an attempt was also made to measure with less precision a large-scale application. In both the detailed and the commercial trial a highly experienced pilot was operating under reasonably good flying conditions.

Conduct of Detailed Trials

The detailed measurement trials were conducted on the property of Mr. H. Johnstone, Whatawhata, Waikato, on April 18 and 19, 1950, in conjunction with the James Aviation Company. One aircraft was used and the measuring area was in each case traversed by four runs of each of three fertilisers — ordinary superphosphate, granulated superphosphate, and serpentine superphosphate. Collecting boxes were placed in a "grid" of 11 rows of 12 boxes each, the boxes being 24ft. apart in the rows, and the rows 100ft. apart. In addition to this grid extra boxes were placed in one longitudinal line at 25ft. intervals and in one transverse line at 8ft. intervals. The total measured area was therefore 1100ft. by 288ft., or about 7½ acres, and the flight lanes averaged about 1 chain apart.

Instead of the normal load of about 570lb. of fertiliser, the loads dropped on the measuring area were 373lb. of superphosphate and serpentine superphosphate and 336lb. of granulated superphosphate for each of the 4 runs. This was done to fit in with the area available for measurement. The aircraft was operating under normal conditions of loading for commercial distribution and accurate sampling of the material distributed was not possible. The wind at the time of the trials was light at ground level, but the pilot estimated it at between 8 and 20 m.p.h. at the altitude of the aircraft, 70ft., and blowing approximately at right angles to the lines of flight. The speed of the aircraft was 80 m.p.h.

Tables 1 and 2 summarise the results of these trials.

Serpentine Superphosphate

Distribution patterns for the serpentine superphosphate spread on the afternoon of April 18, 1950, are shown in Fig. 1. Obviously the wind displaced this fertiliser to one side of the measuring area and a considerable amount fell outside the area despite the efforts of the pilot to allow for wind drift. Some of the serpentine superphosphate fell from the aircraft in relatively large lumps.

The main area of heavy concentration of fertilisers probably results from a mixing of the larger particles, which fall almost straight down, from one run with the smaller particles which have drifted with the wind from the adjacent run. The total measured target area to receive fertiliser was nearly 5 acres, but this is an underestimate, for no account can be taken

Heading photograph by K. R. Wade.

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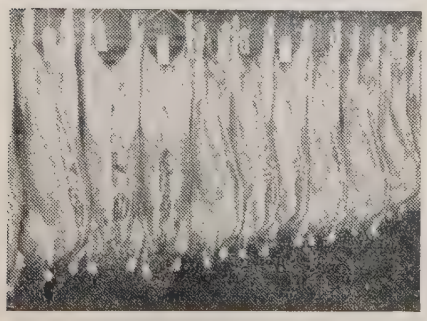

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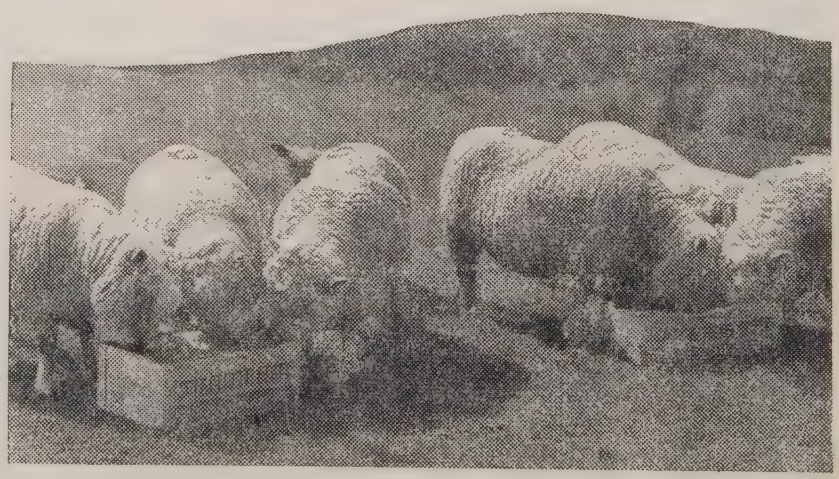

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Fig. 1—Distribution of Serpentine Superphosphate

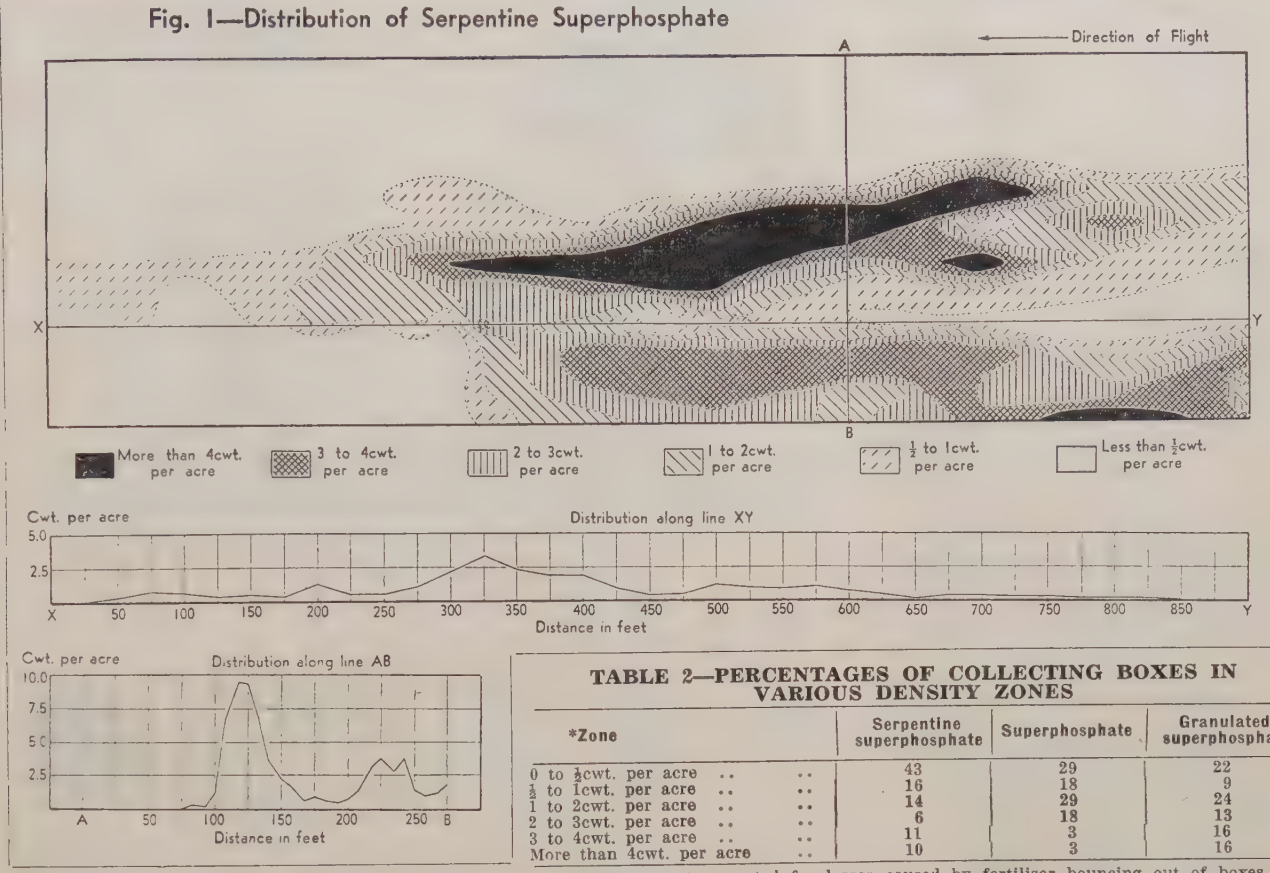


TABLE 2—PERCENTAGES OF COLLECTING BOXES IN VARIOUS DENSITY ZONES

*Zone	Serpentine superphosphate	Superphosphate	Granulated superphosphate
0 to ½cwt. per acre	43	29	22
½ to 1cwt. per acre	16	18	9
1 to 2cwt. per acre	14	29	24
2 to 3cwt. per acre	6	18	13
3 to 4cwt. per acre	11	3	16
More than 4cwt. per acre ..	10	3	16

* Figures not corrected for losses caused by fertiliser bouncing out of boxes.

of the fertiliser falling outside the fenceline.

On the 5 acres on which fertiliser fell the mean density as measured was 1.3cwt. per acre. An attempt was made to identify flight lanes from a detailed study of the distribution pattern and to estimate the percentage of fertiliser measured in relation to that taken up by the aircraft. On the area receiving more than ½cwt. per acre only 62 per cent. of the fertiliser dropped was accounted for. Some of this loss was caused by fertiliser bouncing out of the collecting boxes and some by fine dust drifting out of the target area. Canvas catchers were not used in these trials because of the proportion of fine material in superphosphate and serpentine superphosphate which tends to lodge in canvas and cannot be removed satisfactorily for weighing.

The area receiving more than ½cwt. per acre was 2.8 acres as measured by the distribution graph. On this area the mean density was 2.2cwt. per acre. These figures are all under-estimates of the true density, but the variations in the distribution pattern give a reasonably accurate picture of the type of spread obtained.

Superphosphate

The distribution with superphosphate is shown in Fig. 2. Again the displacement of material to one side of the measuring area is evident. The graphs differ from those for serpentine superphosphate in that the areas of heavy deposition are very small and it is practically impossible to identify the flight lanes from the distribution pattern.

The mean density over the area receiving fertiliser (again about 5 acres) was 1.2cwt. per acre, but by estimating the probable pattern outside the measuring area it was found that only 46 per cent. of the fertiliser dropped from the aircraft was accounted for in the collecting boxes. Though the accuracy of this figure is open to question, probably more straight superphosphate than serpentine superphosphate drifted well away from the collecting area in the form of fine dust.

The area receiving more than ½cwt. per acre was 3.7 acres as measured by the distribution graph and the mean density on this area was 1.6cwt. per acre. Again, all these figures are under-estimated to a considerable degree.

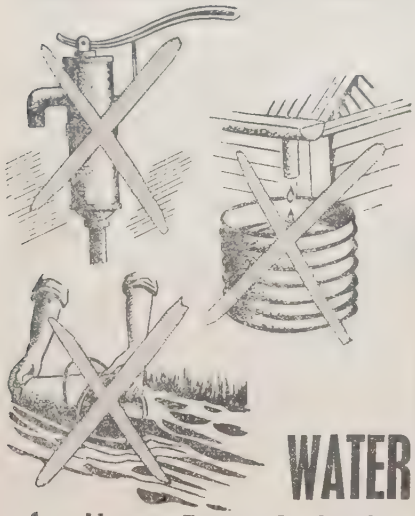
TABLE 1—DISTRIBUTION PATTERNS OF THREE FERTILISERS

Fertiliser dropped	Amount dropped (cwt.)	Area of target (acres)	*Area receiving more than ½cwt. per acre (acres)	*Mean density (cwt. per acre)	
				on target area	on area receiving more than ½cwt.
Serpentine superphosphate ..	12.8	5	2.8	1.3	2.2
Superphosphate	12.8	5	3.7	1.2	1.6
Granulated superphosphate .	12.0	5	3.4	1.3	1.9

* Figures not corrected for losses caused by fertiliser bouncing out of boxes.

Granulated Superphosphate

The distribution with granulated superphosphate is shown in Fig. 3. This material was imported from England for the trials and had a particle size mainly within the range of 9/64 to 12/64in. diameter; 7 per cent. was larger than 12/64in., and 27 per cent. passed through a 9/64in. sieve. There were a few aggregations of granules, which separated easily with pressure from the fingers. It flowed much



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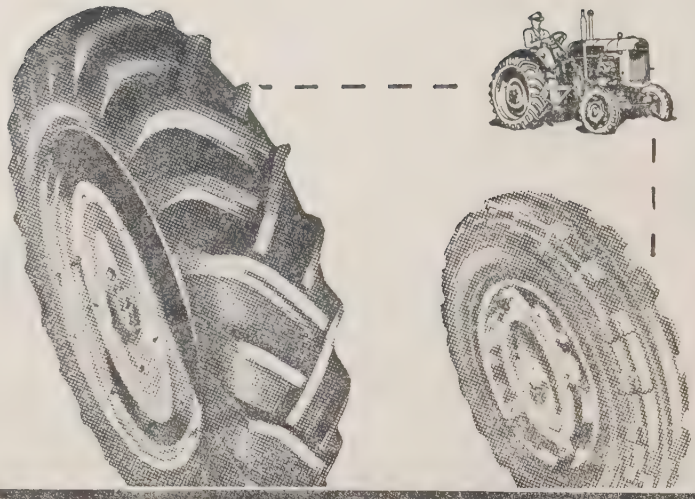

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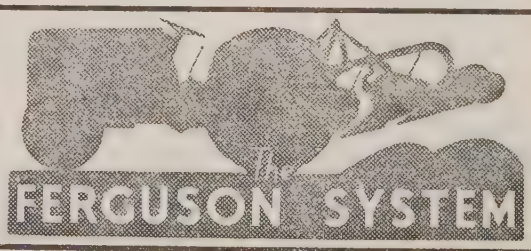

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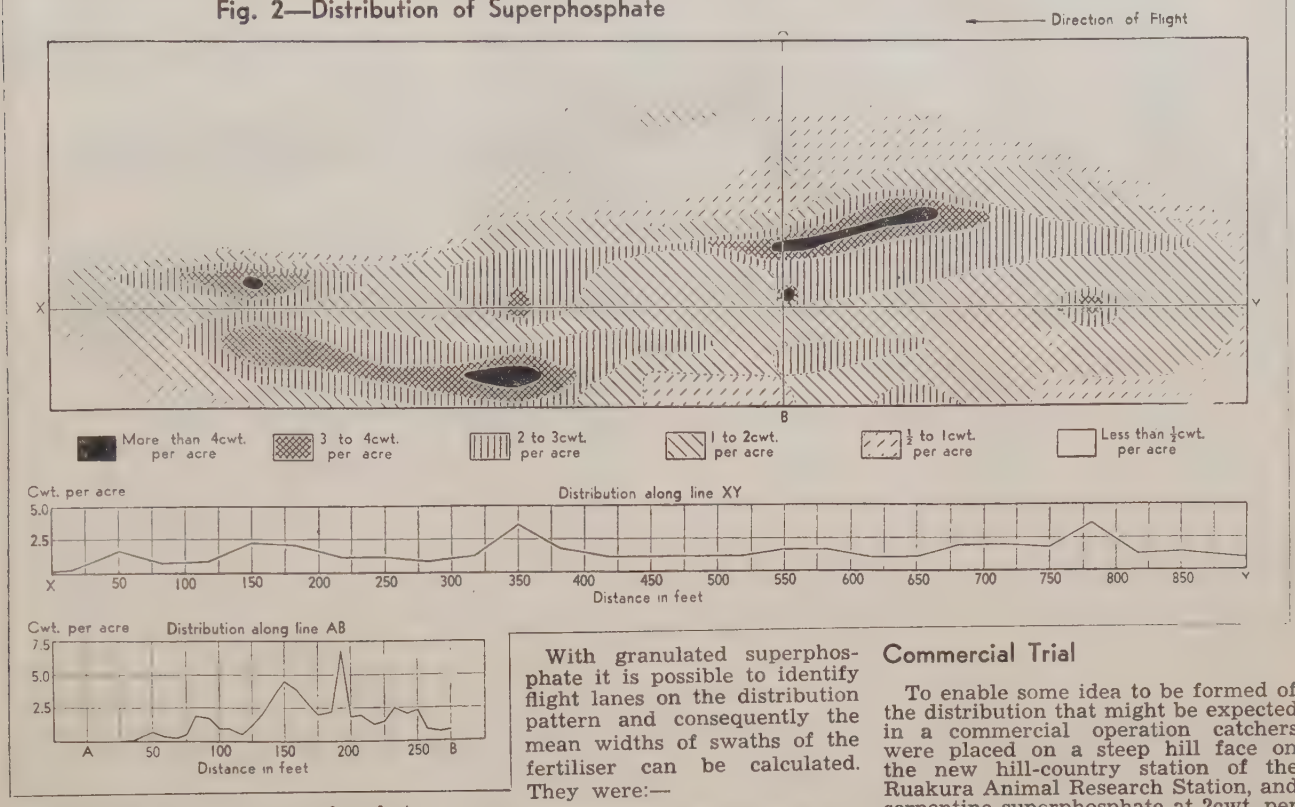
Fig. 2—Distribution of Superphosphate



more rapidly than the superphosphate or serpentine superphosphate, with the result that the last third of the grid did not receive fertiliser because the hopper was empty; that could be avoided by adjusting the size of the delivery hole of the hopper.

The distribution pattern for granulated superphosphate shows clearly that the fertiliser fell where it was intended to fall. Though the wind was stronger in this trial than in those with the other two fertilisers, there was no marked displacement caused by wind. The two central runs overlapped somewhat and the drop from the first run fell right on the boundary of the measuring area. The granules could be seen very easily on the ground, and they extended about 4yds. outside the measuring area.

Though the distribution of granulated superphosphate was in definite bands, it is apparently much more controllable than superphosphate and the area covered was very regular in pattern.

On the 5 acres of the target area a mean density of 1.3cwt. per acre was obtained. Because it was possible to identify a single run with precision, it can be said that 43 per cent. of the pellets bounced out of the boxes. Correction for this and the knowledge that the loss in dust form is negligible increases the mean application rate to 2.3cwt. per acre, and the figures for the distribution graph should be increased by 77 per cent. The loss by bouncing is very much higher with granulated material than with powdered fertilisers like ordinary superphosphate.

With granulated superphosphate it is possible to identify flight lanes on the distribution pattern and consequently the mean widths of swaths of the fertiliser can be calculated. They were:—

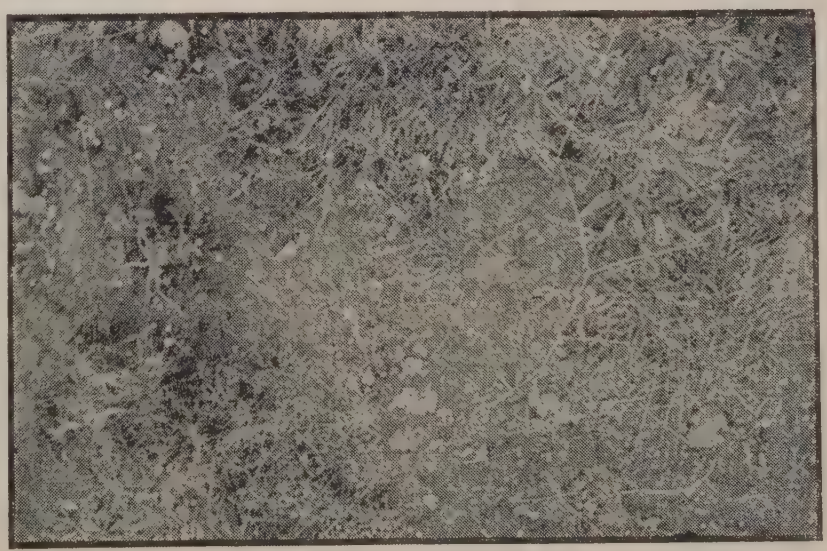
Corrected density per acre	Mean width of fertiliser swath
1cwt. and greater ..	65 to 70ft.
2cwt. and greater ..	60ft.
4cwt. and greater ..	40ft.

In all cases the longitudinal graphs show that there is no regular change in the amount of material released as the run is made.

Commercial Trial

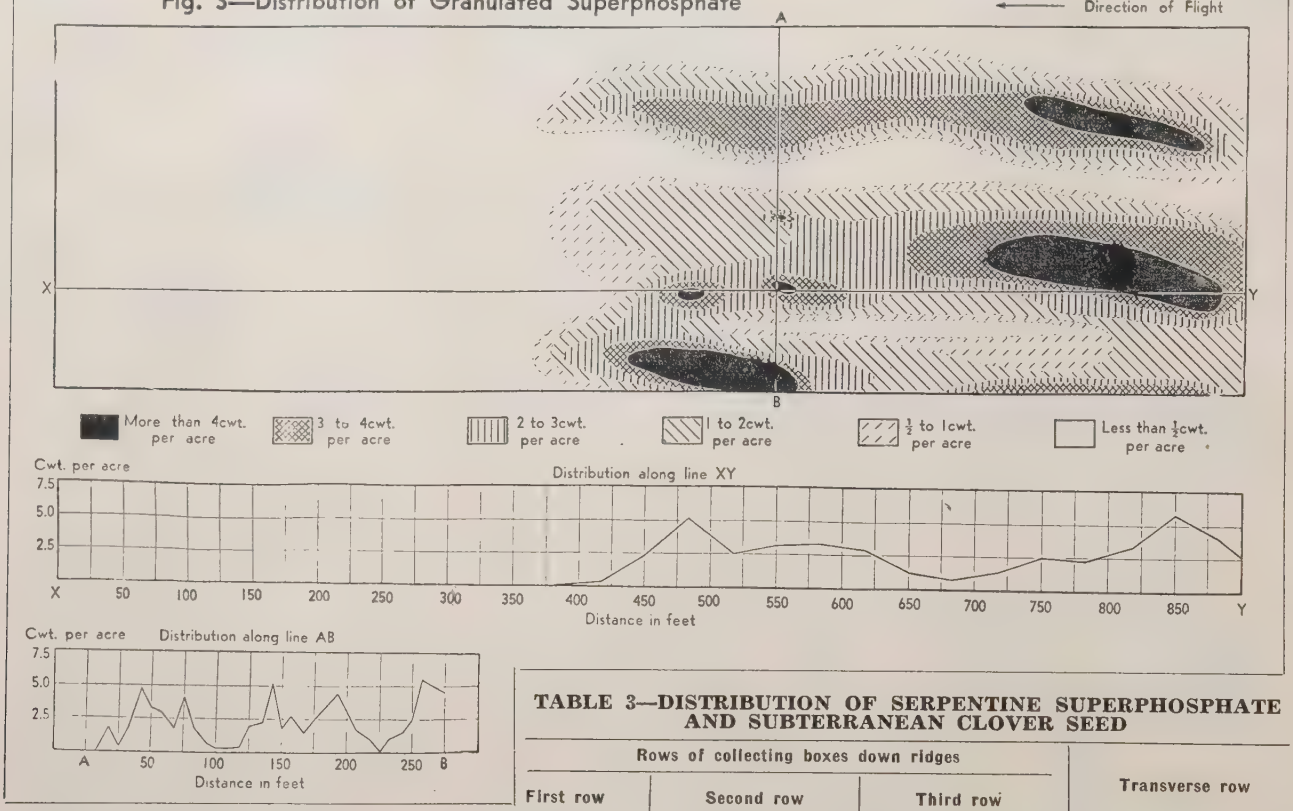
To enable some idea to be formed of the distribution that might be expected in a commercial operation catchers were placed on a steep hill face on the new hill-country station of the Ruakura Animal Research Station, and serpentine superphosphate at 2cwt. per acre with subterranean clover seed at 2lb. per acre was distributed over the area by aircraft as part of a normal commercial operation.

The general layout of the collecting boxes was in three lines down ridges and one line traversing ridges and gullies. The boxes on the outer ridges were 8yds. apart, in the centre row



Granulated superphosphate, imported from England for these trials, as it was deposited by the aircraft.

Fig. 3—Distribution of Granulated Superphosphate



4yds. apart, and in the transverse line 12yds. apart. The weight of serpentine superphosphate (calculated as hundredweight per acre) and the number of subterranean clover seeds collected in each box are shown in Table 3. The figures have been arranged to indicate intervals of 4yds. and the boxes each collect an area of 1½ sq. ft.

It is clear that an exceptionally good distribution of both fertiliser and seed was obtained in this trial.

Advantages of Granular Material

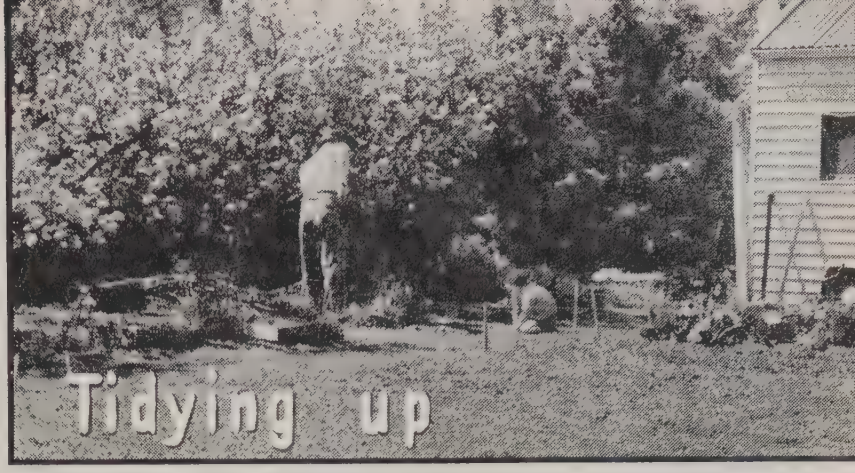
Measurements of distribution of three fertilisers from light aircraft have shown that a high standard of efficiency can be achieved by an experienced pilot. For precision dropping a granulated material is necessary, but with large-scale applications any drift of fertiliser down wind can be compensated by the overlapping effect from parallel lines of flight with fertilisers containing much fine material. Nevertheless, the use of a granulated material offers other advantages, such as permitting operations in relatively strong winds and the better keeping qualities of the fertiliser, which no doubt will create a demand for fertiliser in this condition.

Furthermore, if aircraft have to fly much higher than 100ft. above the ground, probably a granular material will be essential to ensure that most of the fertiliser will fall on the area where topdressing is desired.

TABLE 3—DISTRIBUTION OF SERPENTINE SUPERPHOSPHATE AND SUBTERRANEAN CLOVER SEED

Rows of collecting boxes down ridges						Transverse row	
First row		Second row		Third row			
Weight of fertiliser (cwt. per acre)	Number of seeds per box	Weight of fertiliser (cwt. per acre)	Number of seeds per box	Weight of fertiliser (cwt. per acre)	Number of seeds per box	Weight of fertiliser (cwt. per acre)	Number of seeds per box
0.3	1	0.7	Nil	1.0	Nil	0.7	1
—	—	0.8	Nil	—	—	—	—
0.6	1	0.8	Nil	0.7	Nil	—	—
—	—	0.7	Nil	—	—	0.8	3
1.4	8	0.7	Nil	0.8	Nil	—	—
—	—	0.5	Nil	—	—	—	—
1.6	1	0.3	Nil	0.7	1	0.9	4
—	—	0.3	Nil	—	—	—	—
0.5	Nil	0.7	2	0.7	1	—	—
—	—	1.1	1	—	—	1.8	5
2.8	3	0.6	1	0.6	Nil	—	—
—	—	0.8	Nil	—	—	—	—
1.8	Nil	0.6	Nil	0.5	1	0.6	Nil
—	—	0.7	Nil	—	—	—	—
2.1	6	0.8	3	1.5	Nil	—	—
—	—	0.9	Nil	—	—	0.6	3
0.5	1	0.7	Nil	2.0	3	—	—
—	—	0.8	2	—	—	—	—
0.6	1	0.7	2	1.5	4	0.3	Nil
—	—	0.6	1	—	—	—	—
1.3	4	0.6	2	0.5	Nil	—	—
—	—	0.6	2	—	—	0.8	3
2.3	2	0.8	5	0.7	1	—	—
—	—	1.1	4	—	—	—	—
4.1	3	0.9	3	1.1	Nil	1.0	1
—	—	1.5	6	—	—	—	—
3.0	1	1.4	1	1.5	1	—	—
—	—	1.5	2	—	—	0.4	3
2.4	1	1.5	2	2.2	2	—	—
—	—	2.3	2	—	—	—	—
1.4	3	2.5	3	1.4	Nil	1.0	2
—	—			—	—	—	—
1.5	1			1.5	Nil	—	—
—	—			—	—	0.7	1
0.1	Nil			2.7	3	—	—
—	—			—	—	—	—
0.5	4					0.8	Nil
—	—					—	—
1.3	7					—	—
—	—					0.5	Nil
Nil	Nil					—	—
						—	—
						0.3	Nil

Home Gardening at this Season May be Largely



[*Green and Hahn Photography Ltd. photo.*
Immediate attention should be given to untidy corners and weed growth beneath such places as hedges, as they provide ideal protective cover and hosts for many insect pests and fungous diseases.

By H. P. THOMAS, Vegetable Instructor, Department of Agriculture, Wanganui.

PLANT growth is greatly reduced at this time of year and work in the vegetable garden in May is directed mainly toward keeping the garden cultivated and tidy. If thoughtful planning has been carried out and successive sowings made during summer and autumn, many gardens should still contain such hardy subjects as savoy cabbage, cauliflower, brussels sprouts, turnips, swedes, broccoli, borecole, leeks, celery, silver beet, carrots, and parsnips. These vegetables will still require attention to cultivation, manuring, and spraying to enable them to mature successfully.

UNFORTUNATELY, too many gardens are almost completely vacant by May because of the gardener's waning interest or lack of knowledge of what to sow or plant after summer harvesting has been completed. Therefore this is also the time to consider past mistakes and plan for their rectification. A garden that has only a few of the vegetables listed is evidence of the fact that renewed efforts to rectify omissions will be needed next summer and autumn.

[*Sparrow Industrial Pictures Ltd. photo.*
Whatever type of organic material is used, it should be thoroughly incorporated throughout the soil instead of being "sandwiched" between the topsoil and subsoil.

The home gardener should concentrate more on the production of vegetables for use at this season to assist the family budget at a time when vegetables are expensive to buy. If sufficient sowings and plantings for winter vegetables are made in summer and autumn, there is less need to sow seeds very early in spring when conditions are not always suitable for germination and growth.

Hygiene and Maintenance

Consideration should be given now to possible improvement of drainage and shelter. Growth is affected by soil warmth, and during winter in particular the greatest enemies of soil warmth are poor drainage and cold winds. Raised beds for sowing or planting are of some assistance to winter cropping, and shelter should be provided in all gardens, though it should not be overdone.

Shelter

Vegetables require sunshine and air circulation, but not to the extent that growth is hindered. The amount of protection from wind needed varies with the locality. The following hedge plants are very popular, but the main ones grown in the locality should be observed and their advantages or disadvantages noted:—

For the smaller garden: *Cytisus proliferus alba* (tree lucerne or tagasaste), for temporary quick shelter; *Abelia floribunda*; *Coprosma baueri* (taupata); *Escallonia exoniensis, E. macrantha*, and several other varieties; *Griselinia littoralis* (New Zealand broadleaf); *Hakea saligna*; *Ligustrum sinense* (privet), several varieties; *Lonicera nitida*; *Olearia paniculata* (syn. *O. forsteri*); *Phebalium billiardieri*; *Euonymus japonicus* and variegated varieties.

For larger shelter: *Chamaecyparis lawsoniana* (Lawson's cypress); *Cupressus benthami* and *C. macrocarpa*; *Pittosporum crassifolium* (karo), *P. eugenioides* (tarata), and *P. tenuifolium* (kohuhu); *Populus nigra italica* (Lombardy poplar); *Myoporum insulare* (Tasmanian ngaio).

In the growing season crops such as sweet corn, broad and runner beans, and tall peas may be used to shelter the lower-growing vegetables, but excessive shade on other nearby crops must be avoided.

Clearing up after Crops

As soon as the harvesting of crops is completed the refuse which remains should be cleared off and the healthy material composted or dug in. Burning of all diseased material is advisable, but the ashes may then be used to dress plots. Digging or trenching land as it becomes vacant is recommended at this time of year because of the beneficial action of weathering agents such as wind, sunshine, rain, and frost on the exposed soil. If the land is not required until spring, a quick-growing cover crop such as mustard may be sown with advantage, particularly on light soil.

Liming

Ground which has been dug and is required for early cropping should be given a dressing of 4oz. of carbonate of lime or 2oz. of burnt lime per square yard.

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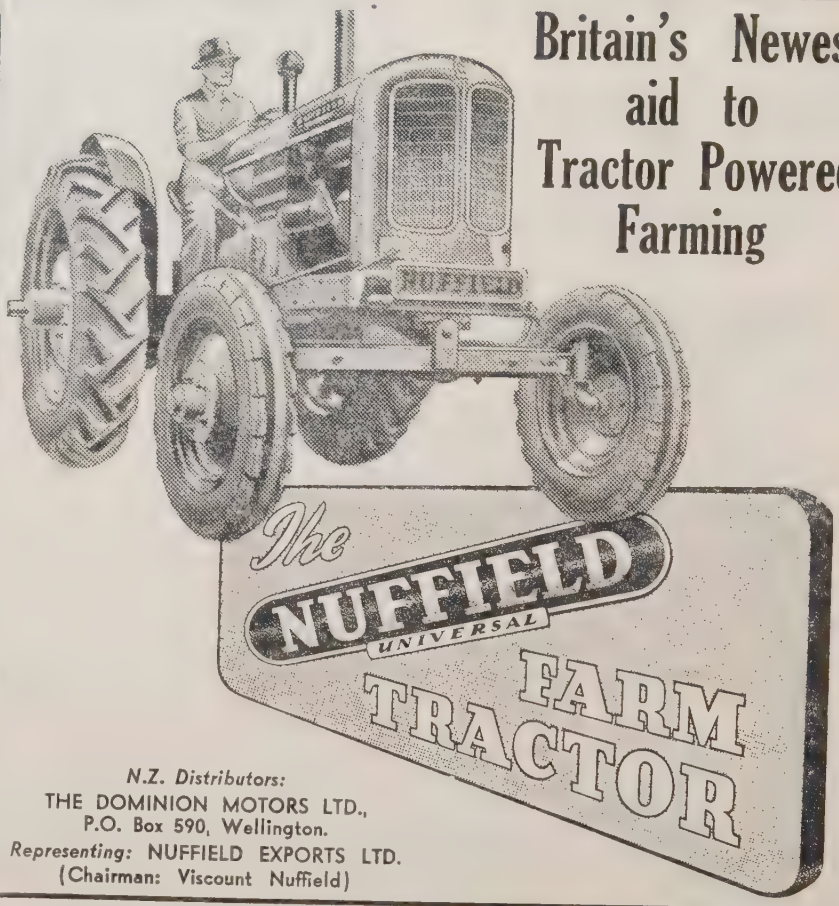

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HOME GARDEN WORK FOR MAY

The application of lime to most New Zealand vegetable gardens is necessary, especially when brassicas and pod bearers are grown. Applications must be regular, because lime is used by growing plants and some is leached from the surface soil by rain.

Lime is not only a manure supplying calcium, but is also a soil improver. Briefly, it corrects soil acidity, liberates certain plant foods which otherwise would not be available, assists bacterial action during the conversion of waste material into humus, and improves the physical structure of soils.

Lime can be applied at any time of year, though perhaps the most convenient time is directly after digging and when preparing the soil for crops. It may be spread on the surface of the ground and eventually is distributed throughout the soil by cultivation and rain. Occasional dustings may also be given as crops develop.

Tidying up

Immediate attention should be given to all untidy corners and weed growth in such places as beneath hedges, as they provide ideal protective cover for many insect pests during adverse weather, and many weeds also act as hosts for fungous diseases. Without this protection the carry-over of diseases will be reduced and many pests will perish from the rigours of winter.

During this general tidying up hedges should be trimmed if necessary.

Planting and Sowing

More particularly in the warmer districts and in sheltered positions, such subjects as spring cabbage, cauliflower, shallots, broad beans, silver beet, and spinach may still be sown or planted. Planting at this time of year entails some risk of failure, and past experience should be the main guide.

Asparagus

Remove the fern growth of asparagus immediately if this has not already been done. It should be cut off close to the ground as soon as the stems begin to turn yellow and before they scatter their seeds. If ripe seed is allowed to fall, young plants are likely to germinate unnoticed and become an annoyance in established beds.

After the top growth has been cut remove all large weeds and topdress the bed to a depth of 2 to 3in. with compost, or well-rotted manure or seaweed, and cover it with clean soil or sea sand. If compost is not available, a handful of blood and bone manure and a similar quantity of soot and wood ashes should be applied to each crown; a thin layer of clean soil should also cover this dressing.

It is customary to give the beds a dressing of salt at 2oz. to the square yard when seaweed or sea sand is unobtainable.

Broad Beans

As broad beans thrive under cool conditions, an initial sowing for spring or early summer may be made during May. These earlier sowings often mature when vegetables are scarce and lacking in variety in most home gardens. Broad beans are not particular about soil, though they grow best in the heavier soils which have been well prepared and manured for a previous crop. Good drainage is essential, but soils which tend to dry out are unsuitable, as this condition adversely affects the setting of the flowers.

[Green and Hahn Photography Ltd. photo.

Because of difficulties in mixing and applying small quantities of different fertilisers to closely spaced rows of vegetables, the application of a complete fertiliser before sowing or planting is often preferable. The area should first be marked off and the appropriate quantity of complete fertiliser mixed with soil or sand and scattered and raked in. Where rainfall is low forking it in is usually better, as it encourages deeper rooting.

Lime is essential for the well-being of broad beans, and a dressing of 2 to 4oz. per square yard is advisable when the soil is being prepared for sowing if the ground is low in content of this important element. If manuring is considered necessary before planting, a dressing of 2oz. of superphosphate and 1oz. of sulphate of potash per square yard is recommended.

A side dressing of equal parts of superphosphate and of blood and bone may be applied on each side of the plants at ½lb. to each 12ft. of row when the plants are about 12in. high. This application may be made when the plants are moulded up, which is desirable to help support them at this time of year.

The seed may be sown 6in. apart and 2in. deep in double rows about 10in. apart, allowing 4ft. between the rows. Germination is usually satisfactory, but it is advisable to plant a few extra seeds at the ends of the rows to fill gaps that may occur.

When the plants are about 3ft. high they may be "stopped" by pinching out the tops. This encourages lateral growth and better setting of the pods. These succulent tips may be cooked and eaten.

Varieties: Broad Windsor and the long-podded varieties are most widely grown in New Zealand. Leviathan long pod produces pods with 10 to 12 seeds, and Broad Windsor has about 5 large seeds to the pod. Broad Windsor is generally considered to be of superior flavour, but the long-podded beans are hardier, yield more heavily, and usually are earlier.

Cabbage

The well-planned home garden should now be well supplied with intermediate and late-maturing savoy cabbage (Late Drumhead and Omega), to be followed by spring-maturing varieties planted during February and March. This succession of planting should provide supplies up to October.

Where winters are mild spring cabbage may still be set out as ground becomes available. Because their growth will be slower than that of plants established earlier, it is important that sturdy plants be chosen for May plantings. The situation should be sheltered and where possible have a northerly aspect to obtain maximum sunshine. The plants will benefit at this time of year if they are planted in raised beds or on ridges.

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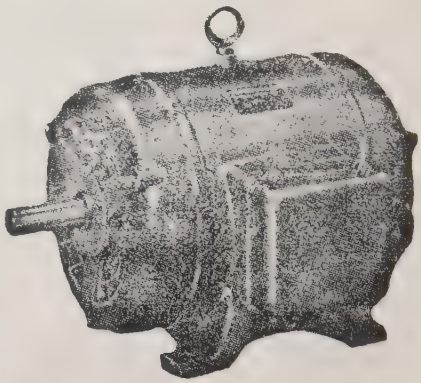

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A well-drained soil, rich in organic matter, is desirable for the production of good-quality cabbage in spring. A topdressing of carbonate of lime at 4oz. per square yard should prove beneficial where soils are acid. A fertiliser mixture of 3 parts by weight of blood and bone, 1 part of superphosphate, and ¼ part of sulphate or muriate of potash, applied at 4oz. per square yard, should be satisfactory. The fertiliser should be spread along the proposed rows and hoed in lightly, and the soil then drawn up to form ridges about 6in. high. The ridges should be 24in. apart, with 6in.-wide flattened tops made with the back of the rake.

Another method recommended is to set out plants in diagonal pattern 12in. apart each way. If desired, alternate plants may be cut when they have developed to a reasonable size, not necessarily with pronounced hearts, leaving the remainder of the bed to reach full development.

During July or August, according to locality, the young plants will benefit from a dressing of nitrate of soda or sulphate of ammonia, preferably in liquid form at 1oz. to 4 gallons of water.

Though caterpillars of the white butterfly and diamond-backed moth are not likely to be very prevalent from now on, the grey cabbage aphis may persist despite the weather, distorting and fouling the foliage and the growing points of members of the cabbage family. For satisfactory control of this pest use a spray containing 1 fl. oz. (7 teaspoons) of nicotine sulphate in 4 gallons of water to which 2oz. of soft soap or soap powder has been added. More than one application may be necessary, and results are likely to be best during the warmest part of the day.

Varieties recommended for planting in May are Flower of Spring, London Market, Enfield Market, Jersey Wakefield, and Charleston Wakefield.

Cauliflower

In districts where winter conditions are not too severe the hardier types of cauliflower may be set out now in sunny, sheltered situations. In localities less favoured planting is better delayed until July, August, or even September. The requirements of cauliflower are similar to those of cabbage except that cauliflowers are not as tolerant of adverse soil and weather conditions. They must be kept growing steadily, as any checks received during growth are likely to retard proper development and result in premature "bolting" to seed or "buttoning" of heads. With good growing conditions May plantings should mature in October-November after most of the broccoli crop has been harvested.

May plantings should be made on ridges as advised for cabbage, but the ridges should be 2ft. 6in. apart and plants 18in. apart. The soil should be rich in well-rotted organic matter such as compost or farmyard manure, supplemented with a base dressing of 3oz. of the cabbage fertiliser mixture to each yard of row. Side dressings of the same mixture at 2oz. to each yard of row may be given at monthly intervals for the next 3 months if growth appears slow.

Varieties for planting now are Phenomenal (5 months), Late Metropole, Walcheren, and All Seasons.

Lettuce

To form quality hearts lettuce must grow quickly. Constant feeding and attention to locality are necessary for worth-while results, particularly at this time of year. Raised beds are recommended for any plantings of lettuce, even in favourable localities, and a sheltered part of the garden should be used, with a northerly aspect if possible. Protection from cold winds is very important at this season. The ground should be well drained and have plenty of organic matter incorporated in it some time before planting.

[*Green and Hahn Photography Ltd. photo.*
Shallots should be graded to size when they are set out. They are very hardy and high in food value, and they yield heavily if weed growth is kept down and conditions are good.

As growth at this time of year is likely to be slow, weekly applications of a quick-acting fertiliser such as nitrate of soda, applied in liquid form using 1oz. to 4 gallons of water, will be of benefit. Liquid animal manure may be used as a substitute. The following fertiliser mixture worked into the beds before the plants are set out should assist toward maximum growth during winter: Superphosphate 3oz., dried blood 2oz., sulphate of ammonia 1oz., and sulphate of potash ½oz. to the square yard. Despite generous manuring, the plants harvested are usually small because of the colder weather.

Set the plants 8in. apart, with 12in. between rows.

Varieties: Neapolitan Winter Market and Imperial No. 615 are suitable for cooler conditions. For gardeners who prefer the cos or romaine variety, Champion Cos is especially suitable for planting at this time of year.

Radish

Perhaps the easiest vegetables to grow in the garden, radishes may be had almost the whole year round by making sowings every 4 weeks. They prefer a soil with a high humus content and adequate moisture. To be tender and mild in flavour they must be grown quickly; otherwise they are likely to be hot and tough.

Fresh manure should not be used. If the soil is not considered rich enough, a mixture of equal parts of dried blood and superphosphate should be broadcast at 4oz. per square yard and worked in several weeks before the seed is sown. Sow the seed thinly ¼in. deep in rows wide enough to allow for hoe cultivation.

Varieties: At this time of year, when growth is slower, it is advisable to sow the smaller varieties such as red and white turnip-shaped and French Breakfast.

Rhubarb

Established beds of rhubarb will now benefit from weeding and manuring. Weed seedlings make particularly strong growth in the rich soil which suits rhubarb, and perennial weeds such as couch, convolvulus, docks, and oxalis must be removed before they become large and well established.

Rhubarb responds to heavy manuring, and after being cleaned the bed can be topdressed with 2 or 3in. of compost or well-decayed stable manure. If neither of these is available, apply a good handful of blood and bone manure to each plant and work it in lightly. Cultivation of this crop should be shallow at all times.

If it is intended to make a new planting in June, now is the time to prepare the bed. The ground should be trenched to a depth of at least 2ft. and plenty of well-rotted farmyard manure or compost incorporated throughout. Well-weathered, damp straw with which has been mixed a handful of sulphate of ammonia to each 9ft. of row is a good substitute for stable manure. As rhubarb beds are semi-permanent, their preparation should be thorough.

Shallots

An easy and prolific crop to grow, shallots are a suitable substitute for onions, of which they are a species. Though perfectly hardy, shallots are best planted in a sunny position where they will ripen properly. The larger bulbs should be selected, and when planted at this time they will be ready for harvesting in December or January.

They prefer a light, well-drained, rich, loamy soil which has been heavily manured for a previous crop. If manuring is considered necessary, a mixture of equal parts of blood and bone and of superphosphate, plus 5 per cent. of sulphate of potash, should be worked in thoroughly at the rate of 4oz. per square yard.

Shallots should be pressed lightly into the ground unless the soil is very loose, when they may be partially buried to allow for sinking of the soil surface. Plant them 6 to 8in. apart with 12 to 15in. between the rows. During the growth of the crop the ground should be cleaned of weeds and lightly cultivated.

HOME GARDEN WORK FOR MAY

A strong, heavy mass of leaves encircles the head of a broccoli. One or two of them should be bent over to protect the developing curd.

[*Green and Hahn Photography Ltd. photo.*

Spinach

A further sowing of spinach may be made in most localities during May. As quick growth is necessary for the production of tender, succulent leaves, the plants must not be allowed to suffer for want of water. Spinach is not difficult to grow if given plenty of plant food and moisture.

Lime may be necessary on soils not recently dressed, though too much lime may result in a yellowing of the leaves. As growth progresses regular applications of liquid manure will be beneficial. If farmyard manure is not available for preparing liquid manure, nitrate of soda or sulphate of ammonia at 1oz. to 4 gallons of water may be used. If the soil is dry, it is advisable to water the plants before giving the liquid manure.

Seeds should be sown 3in. apart and ½in. deep in rows 1ft. apart. If they are planted in this way, thinning of the young plants will not be necessary. Sow seed every 4 weeks to provide a succession.

Variety: The prickly-seeded or winter variety, Giant Prickly, is grown at this time of the year.

Tomatoes

Except in the warmer districts not subject to early frosts, tomatoes will have finished bearing. Plants and their supporting stakes or wires should now be removed if that has not been done. Badly damaged stakes and the string used for tying are best burnt, as they are likely to harbour pests or diseases. Plants infested with serious pests or diseases should be dried and burnt, but clean plants can be put on the compost heap.

As soon as the crop refuse has been cleared the ground should be deeply dug, and then be left rough to expose it to the weather or be sown with a cover crop.

Winter Crops

Crops such as savoy cabbage, broccoli, borecole, leeks, celery, and silver beet should be kept cultivated and weed free. Though conditions are now cooler, some spraying may still be needed.

The damage caused by pests and diseases is a major factor limiting the production of vegetables, fruit, and other garden plants. Most gardeners pay careful attention to cultivation and manuring, but frequently fail to take adequate precautions against attacks by insects or fungous diseases.

If caterpillars of the white butterfly and diamond-backed moth are still persisting and doing damage, spraying or dusting should be carried out. Applications of D.D.T. 2 per cent. dusts or D.D.T. 50 per cent. wettable powder (½oz. in 4 gallons of water) every 2 or 3 weeks will give satisfactory control. Where aphis is present nicotine sulphate should be used at the rate of 1 fl. oz. (7 teaspoons) to 4 gallons of water plus 2oz. of soft soap or soap powder. Alternatively, a combined spray consisting of 1 fl. oz. of nicotine sulphate and 1¼oz. of arsenate of lead plus 2oz. of soap to 4 gallons of water can be used to control all three pests.

For downy mildew or other fungous diseases which may appear, particularly in the seed-beds, spray regularly with Bordeaux mixture 3 : 4 : 50; 4 gallons contains 4oz. of bluestone and 5¼oz. of hydrated lime. Celery crops should be sprayed with this Bordeaux mixture at 10- to 12-day intervals as a protection against late blight. Bordeaux can be combined with the arsenate of lead and nicotine sulphate, in which case no soap is necessary, as the lime in the Bordeaux activates the nicotine.

In cooler districts broccoli plants other than those of the self-protecting kind should have some of the leaves broken or tied over the curds as they mature to protect them from frosts.

Every advantage should be taken of fine weather to cultivate between growing crops. Light cultivation with a hoe should be frequent enough to check weeds, which may rob the plants of food and act as hosts for insect pests and diseases.

Moulding up is now carried out with many vegetables. It forms ridges which give support during stormy weather, and also assists soil drainage, which is often very necessary, particularly with winter crops in heavy soil.

Vegetables in storage, such as potatoes, marrow, pumpkins, and onions, may need sorting over. Those showing signs of decay should be removed promptly.

METEOROLOGICAL RECORDS FOR FEBRUARY

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	63.8	— 1.8	78.0	43.0	11.02	13		3.37	1	157.4
Auckland	160	67.0	+ 0.2	78.0	55.2	4.34	12	+ 0.63	1.38	28	171.8
Tauranga	10	64.8	— 0.1	78.9	49.8	3.55	11	— 0.35	2.10	28	226.9
Ruakura	131	63.2	— 0.1	80.3	41.2	2.28	12	— 0.90	0.68	10	186.8
Rotorua	980	63.6	+ 1.3	81.2	44.0	4.69	12	+ 0.51	2.30	28	190.1
Gisborne	12	63.8	— 1.3	81.2	44.9	3.50	15	+ 0.43	1.25	8	198.2
New Plymouth	160	63.4	+ 0.8	76.2	50.0	5.20	14	+ 1.04	1.21	10	212.7
Napier	5	64.8	— 0.6	81.8	49.4	2.86	11	+ 0.14	1.01	8	205.6
Taihape	2157	60.0	+ 1.1	78.0	43.8	1.50	9	— 1.37	0.39	19	
Wanganui	72	64.0	+ 0.6	82.4	49.8	1.82	9	— 0.96	0.70	10	225.5
Palmerston North	110	63.5	+ 1.2	80.0	43.0	1.85	8	— 1.02	0.69	9	216.9
Waingawa	350	61.3	— 1.1	83.5	37.0	2.50	11	— 0.29	0.85	28	213.1
Wellington	415	62.0	+ 0.8	75.7	46.9	1.90	7	— 1.22	0.69	28	228.9
Nelson	24	63.9	+ 1.1	75.7	52.3	2.75	8	— 0.14	1.01	14	250.7
Blenheim	12	61.4	— 2.0	84.0	42.8	2.35	5	+ 0.33	1.07	14	227.3
Hokitika	12	59.0	+ 0.6	71.6	43.2	7.79	12	— 0.21	1.85	10	214.2
Hanmer Springs	1225	57.8	— 1.5	84.0	37.0	4.87	8	+ 1.09	2.82	9	182.7
Christchurch	22	60.3	— 0.5	75.4	43.1	5.00	5	+ 3.19	3.07	9	179.6
Ashburton	323	58.8	— 1.4	88.4	39.0	4.54	7	+ 1.93	3.39	9	161.8
Timaru	56	59.8	— 0.4	80.0	42.4	1.58	5	— 0.65	0.85	9	145.3
Alexandra	520	62.6	+ 1.1	85.1	40.8	0.32	3	— 1.18	0.28	6	192.8
Taieri	80	57.2	— 0.5	77.3	33.8	2.23	5	— 0.18	1.47	9	168.3
Invercargill	32	57.2	+ 0.4	79.0	36.0	2.17	9	— 1.45	0.97	6	140.6

Developments in Spray Irrigation of Pastures

CERTAIN aspects of experimental work on spray irrigation dealt with in the "Journal" for June, 1950, are brought up to date in this article by H. E. Annett, Field Research Officer, Rukuhia Soil Research Station, Department of Agriculture, Hamilton. Developments in spraying technique have halved the former labour requirement, and information is given about the loss of water from a pasture surface and variations in subsoil water level. Such aspects should be of interest to the large number of New Zealand farmers who have installed or are installing spray irrigation plants. An article in next month's issue will deal with the economics of spray irrigation, with particular reference to results on the writer's farm.

LAST year's article summarised the results of 2 years' investigation work at the Rukuhia Soil Research Station, the idea underlying which was to determine if irrigation by overhead spray of, say, 10 to 15 per cent. of the area of a dairy farm is economic. Two types of equipment were referred to—revolving sprays and movable spray lines. Plants of both types are now in operation in New Zealand.

Large Revolving Sprays

Two makes of revolving-spray equipment are in use, one produced locally and one imported from England. One installation near Hamilton has two revolving sprays each covering a little more than 2 acres and each delivering more than 20,000 gallons per hour. The water is pumped from the Waikato River by a 30 h.p. diesel engine. Each spray weighs 130lb. and is mounted on a sledge. Smaller sprays each dealing with between ¾ and 1¼ acres are in use on other farms. According to size these sprays work at pressures varying from 57 to 100lb. per square inch and deliver from 4000 to 26,000 gallons per hour.

Because of the high pressures, the pipe leading from the pump must be of heavier gauge than that used in the movable pipe system. Therefore, though the revolving-spray system calls for fewer movements, the weight of the sprays and piping makes the work more arduous. The high pressures used also mean higher power costs.

However, where large areas have to be irrigated and plenty of water is available there is scope for such sprays. They can also be used on very uneven or sharply rising ground where operation of the low-pressure movable-pipe system would be difficult. Some such plants are operating on farms bounded by a stream, the spray and diesel engine being moved along the stream to irrigate a strip of land along the bank.

Portion of the area at the Rukuhia Soil Research Station, Hamilton, on which irrigation trials have been carried out.

Movable-pipe System

Many farmers have installed plants of the movable-pipe type, which is used at the Soil Research Station and on the writer's farm. As pressures of only 17 to 30lb. per square inch are used, power requirements are small and lighter-gauge and therefore cheaper piping can be used.

The working of this system was fully described in last year's article. The comments which follow relate mainly to observations on the working of this low-pressure movable-pipe system.

Piping and Stands

Movable spray lines available in Australia and New Zealand are commonly made of 22-gauge galvanised iron.

Several types of irrigation piping are available in New Zealand. Some pipes are supplied in 17½ft. lengths and others in 20ft. lengths, the price complete with couplings varying from £4 15s. to £5 15s. per length for 3in. pipe.

Aluminium pipes have been in use in America for some time and limited supplies are now becoming available in New Zealand. These are made by extrusion and have no seams. Light-gauge 3in. pipe of this type, complete with cast-aluminium couplings, costs about £7 2s. per 20ft. length.

Mounting the spray line on stands makes for convenience. Imported metal stands are costly, but cheaper ones will soon be made in New Zealand. Very efficient cheap wooden stands are now available.

Quite recently the making of plastic piping for irrigation has been started in Australia. Samples received in New Zealand are of excellent quality. The indications are that it will cost about a fifth more than galvanised iron, but plumbing and laying charges will be so low that when installed it will probably be cheaper than galvanised iron. It is fitted with ingenious joints, and the only tools needed for installation are a hacksaw, pliers, and special cement.

Diameter of Piping

The diameter of the main and spray-line pipes has a considerable effect on frictional resistance in the pipelines. Moreover, frictional resistance increases rapidly with the rate at which water is pumped through the pipe, as is shown in the following table:—

FRICTIONAL LOSS IN POUNDS PER CHAIN LENGTH OF PIPE

Rate of pumping (gallons per hour)	Diameter of pipe 3in.	4in.	5in.
2,000	.24	.06	.01
4,000	.91	.22	.07
5,000	3.38	.78	.26
12,000	7.36	1.69	.56
16,000	9.13	2.16	.69

The irrigation of 10 to 15 acres of land would usually require up to 15 chains of piping. Using 3in. pipe and pumping only 2000 gallons per hour would entail a frictional loss of 15 x .24 = 3.6lb. Pumping 4000 gallons per hour through the same pipe would result in a frictional loss of 15 x .91 = 13.65lb., and more power would be required. It would probably be more economical to use this extra power than to use larger piping, but for more than 4000 gallons per hour the use of 3in. piping would call for a high-pressure system, for which this piping is not designed.

For areas larger than 15 acres where more than 4000 gallons of water per hour is required 4in. piping is desirable. With very large installations using 12,000 gallons or more per hour 5in. piping would be advisable.

Advantages of Revolving Spray

Each maker of spray irrigation plant uses a spray nozzle of a different pattern. Nozzles cost from 6s. to £1 each in New Zealand and usually cover a circle of 35ft. diameter, which means that the spray line is moved 35ft. to each new position. Muddy water interferes with the action of some types.

Rubber tubes about 11in. long and grooved spirally have been tried in Australia and in the Rukuhia experiments with good results. Sediment cannot block them and they cover a circle of 40 to 50ft. diameter. A supply of rubber tubing of this type was made up for experimental purposes. It was found that the length of tube required for efficient spraying varies with the water pressure: The higher is the pressure, the shorter must be the tube. Each rubber tube spray costs less than 2s.

For special purposes the rubber spray may have its uses, but more recent work at Rukuhia indicates that the types of spray head hitherto in use will become obsolete on grassland. Several types of revolving spray on the market have been tried on the writer's farm. These cover a circle of 70 to 90ft. diameter when working at quite low pressures of 18 to 25lb. per square inch. Each delivers 500 to 700 gallons of water per hour. Such sprays cannot be blocked by sediment and their use halves the labour of moving pipes.

As they cover a circle of fully 70ft., compared with the 35ft. covered by the other types, the spray line can be left in one position twice as long and then can be moved 70ft., or four pipe lengths, along the main to the next position. On the writer's farm the spray line had to be kept in one position for 2 hours to give 1in. of water per acre with the old type of spray, and 15 minutes were needed to move it to its next position 35ft., or two pipe lengths, further along the main line. Since the revolving sprays have been used, spaced at intervals of four pipe lengths or 70ft., the spray line is kept in position for 3½ to 4 hours to give 1in. of water, and still only 15 minutes is needed to move it to its new position 70ft. further along the main line. Not only is the time spent in moving pipes halved, but farm labour is free to work for 4-hour periods elsewhere.

Underground Mains

Laying the main line from the pump to the spray line underground results in an additional saving in labour. Asbestos piping is ideal for this purpose, and 4in. piping fitted with hydrant take-offs for the spray line is cheaper than movable pipe mains. Unfortunately, immediate delivery of this piping cannot be obtained.

Automatic Irrigation

A system of automatic irrigation being developed in Australia was briefly referred to in the article published last June. This equipment is now being manufactured in Australia.

It is intermediate in type between the small revolving sprays attached to movable pipes and the large revolving sprays which cover 1 or 2 acres. Each revolving spray covers ¼ acre, a battery of four covering an acre. To cover 1 or 2 acres with the large revolving sprays much power and high pressures are needed. The new Australian sprays, which are automatic in operation, require a pressure of only 25lb., and a flow of 2500 gallons per hour keeps the four sprays in continuous operation without attention. Plastic piping is used throughout.

Effect on Underground Water-table

The effect of irrigation on the underground water level varies with local conditions. In parts of Queensland and California where water is drawn from the subsoil for irrigation the subsoil water-table is falling seriously. The rainfall is low, and much of the water pumped from below for irrigation evaporates either from the bare soil or through the leaves of the crop. This loss is greater than the rainfall, and so the subsoil water-table must fall steadily. Where irrigation water is not drawn from the subsoil, but is brought from a river outside the area irrigated, the subsoil water will tend to rise and efficient subsoil drainage must be provided.

In the Waikato, water for spray irrigation will be obtained mainly from streams or wells. Concern has been expressed about the effect widespread use of water from wells for spray irrigation may have on farm water supply.

Some misconceptions about the underground water supply in the Waikato appear to be common. Over much of this area there is a large, permanent, underground water supply, the level of which is a long way above river level. Matangi railway station is 171ft. above sea level and Hamilton railway station 131ft.; the Waikato River at Hamilton is only 88ft. above sea level. Yet the water-table on farms in the Matangi area is usually higher than 20ft. below the surface and fully 60ft. above river level.

Work at the Rukuhia Soil Research Station shows that the loss by evaporation from the soil surface and through the leaves of the pasture plants is 28 to 30in. each year, and this figure varies little from year to year, whether the rainfall be high or low. In a low-rainfall year with poor pasture cover probably a bigger proportion of the water evaporating from the surface is lost from the soil itself and does not pass through plant leaves; in a good-rainfall year with good pasture cover the plant uses more of the water and a lower proportion is lost from the soil by evaporation. However, the important point is that, whether the soil is covered by a good or by a poor pasture, some 29in. of water is lost from the surface into the atmosphere. Any rainfall in excess of this amount passes down into the subsoil out of reach of plant roots and helps to maintain the subsoil water level. Therefore in a year of good rainfall, say 50in., the balance would be 50 — 29 = 21in., and this would help to keep up the subsoil water level. In a recent year of poor rainfall the balance was only 34 — 29 = 5in., which is why in such low-rainfall years the level of well water commonly falls. However, ample water is present, and all that is needed is to deepen the wells.

This is one of the ways in which work on soil drainage losses at the Soil Research Station is giving information of practical value.

The object of spray irrigation is to raise the rainfall to the normal amount and thus maintain a good, close turf; instead of water being lost from bare soil by evaporation, the water can then be made use of to grow pasture. As 28 to 30in. of water is necessarily lost from the surface in any case, the aim should be to keep a good, close pasture throughout the dry, hot weather, or much of the first rain which falls after a dry period evaporates from the bare soil and is lost to the plants. The only way in which this good pasture can be maintained is by irrigation. When the soil receives ample moisture to grow good pasture throughout the summer about 45 per cent. of water falling on the surface, as either irrigation water or rain, drains down into the subsoil to help maintain the underground water-table.

An understanding of this subject is important, as concern has been expressed that spray irrigation will affect farm water supply from wells. Let it be assumed that on a farm of 100 acres 15 acres are irrigated. The maximum amount of water necessary would be 1in. every 10 days, or 3in. per month. If irrigation were carried out for the very long period from December 1 to March 31, 12in. of water would be used in the 4 months. Of this amount only 8in. at most would evaporate either from the soil surface or through the leaves of pasture, and fully 4in. would drain back into the subsoil water-table, so that over the 15 acres under irrigation the water-table would be lowered by 8in. Over the whole farm of 100 acres this would amount to only 15/100 of 8in. or 1.2in., and surely this amount would be negligible.

On the writer's farm at Matangi, where water is pumped from two wells 7yds. apart, pumping from only one well did not affect the level of the water in the other well. At the Matangi dairy factory 12,000 gallons per hour are pumped from similar wells, and no complaints have been received that farmers' wells in the neighbourhood have been affected.

Pig Production Policy: Increased Numbers, Lighter Weights

REPORTS during the last few months of Britain's meat ration being on a lower level than at any stage during or since the Second World War give serious cause for consideration of what can still be done in this country to help further in building up the very meagre British ration. In this article A. Longwill, Superintendent of the Pig Industry, Department of Agriculture, Wellington, outlines pig production policy aimed at the export to the United Kingdom of much larger quantities of porker carcasses than have been sent for over 10 years.

FOR almost a year now it has been the policy of the National Pig Industry Council to direct emphasis in pig production toward the lighter-weight pig and to concentrate on the carcass weights and quality most sought by the trade.

The first practical step was taken in May, 1950, when a premium of 1d. per pound on porker-weight pigs was established in the Meat Board's price schedule. Because realisations under the United Kingdom contract did not cover this, the Meat Industry Account has had to bear the cost of this premium pending the increase in the contract price announced at the beginning of February.

As the increase was substantial (3d. per pound), representing about 27½ per cent., the National Pig Industry Council representatives agreed that they would not ask for further support from meat industry funds. Therefore the money available to allocate to increased schedule payments was consideraly less than the 3d. per pound by which the contract price was increased.

Scales should be used to ensure that all pigs are marketed in the premium weight ranges.

In line with the policy of giving incentive to production of porkers for export, the full 3d. increase was allocated to the most suitable range of porkers for the London market, 60-80lb. Prices for other weight ranges were fixed with a view to maintaining production of baconers of the most suitable weights and to absorb practically the whole of the estimated fund available as a result of the over-all increase in the contract price.

There are a number of reasons justifying the decision to provide an incentive for the production of more porkers for export: Britain's meat ration is at a dangerously low level. Fresh meats, of which pork is one, are likely to be in short supply longer than is bacon. The quality of New Zealand porkers is well and favourably known on the London market and the production of a substantially larger proportion of porkers than is being produced today is well suited to the type of feed supply available and the economy of production.

Before the war Britain produced more than 80 per cent. of the fresh pork she required, but the changed situation, particularly with regard to concentrate feed-stuffs, dictates the production at Home of heavier pigs than are preferred on the London pork market.

Reduced Meat Consumption in U.K.

In most countries with a high standard of living meat consumption has increased since 1945 until it has reached, and in some cases exceeded, pre-war levels. In Britain the 1949 level of meat consumption was 74lb. per head against 119lb. before the war. This compares with 194lb. in New Zealand.

"A striking exception to the general rise in meat consumption in countries with a high standard of living is, of course, provided by the United Kingdom", states a review of the Commonwealth Economic Committee's second post-war report in the commodity series on "Meat", covering the post-war years up to 1949.

The opinion expressed in this authoritative publication should be pondered by producers of all types of meat, who will inevitably be affected by the buying habits developed over the years by the British consumer.

The quality of New Zealand porkers compares favourably with any available to the British public, but the amount of pork available there in recent years could, perhaps, best be described as "fragmentary". The housewife does not ordinarily see pork in the butcher's shop and when she does it has probably been in store a very long time. However, the demand for New Zealand pork could very easily be rebuilt if there was an increase in production which would justify regular shipments.

Britain would still welcome pig meats in increased quantity in all weights, but in view of the long-term market prospects and the fact that the production of a higher proportion of porkers would give a more flexible system suited to the poor supply, the National Council decided that the right policy for the industry in New Zealand was to encourage porker production. There is still an unexploited production potential in dairy by-products that are unused or wastefully fed, and the first essential to securing better utilisation is to have an adequate supply of pigs to cope with the food supply during the flush months of the dairy season in particular.

The incentive of increased prices should make it well worth while to increase sows and breed more pigs for porker production. At the same time, as long as dairy by-products are in ample supply, pigs should, of course, be taken to baconer weights, and here the practice of restricting the amount of milk used in finishing to not more than 5 gallons a day not only will enable better-quality carcasses to be produced, but will mean more efficient use of the food available.

PIG PRODUCTION . . .

There is some indication in the pig killings to date this season that producers have responded quickly to the incentive to produce lighter and better-quality carcasses. Killings for the first half of the production season are up 10 per cent. on the previous year's figures, with a marked swing to porker production. At the same time the lighter type of pig being supplied to the bacon curer is meeting with approval. Everyone was well aware that the production of the heavy, over-fat pig, which was too often evident in recent years, was wasteful, and there has apparently been a ready response to the first incentive to produce a more acceptable pig.

Values on Present Schedule

The maximum gross hooks price is reached at £8 for the prime baconer weighing 160lb. That it certainly will not pay to go beyond this weight—though it may pay better, if sufficient pigs are available, to finish pigs as porkers—is evident when the following prices, which represent the maximum gross return for carcasses within each weight range, are studied.

Weight of Carcass lb.	Rate s. d.	Value £ s. d.
80	1 2	4 13 4
100	1 0	5 0 0
120	10	5 0 0
160	1 0	8 0 0
180	10	7 10 0
200	8	6 13 4

Though this price schedule will undoubtedly give every incentive to producers to breed more pigs for light-porker production, it must be stressed that when food supplies available are adequate to take the pigs up to 150-160lb., this will usually be more profitable than selling them as light porkers if this entails buying in other pigs for fattening.

Production Policy

As many baconers as have been produced in recent years will still be required. Practically the whole of these are required for local trade, and consumption still shows a rising trend. The only change required is that baconers should all be killed at weights under 160lb., and the schedule on which the local trade has operated since October, 1950, discouraging the production of heavier weights, has already had a marked effect on the weights of carcasses produced and has reduced the proportion of heavy, over-fat pigs considerably.

So that the total weight of pig meat produced does not decline the preparatory stage of building up the sow population must precede the change in type of production. Attention has been drawn to this fact through the "Journal" periodically for the last 4 years, and, despite the lack of any financial incentive until recently and the loss of certain sources of pig food supply in the meantime, the downward trend was arrested in 1947.

Though no substantial increase of sows has been shown in any figures published to date, reports from the field and the increased killings in the early part of this season indicate that with the advent of financial incentive to breed more pigs there has been an appreciable response in the form of keeping extra sows.

Profit in Porkers

The substantial increase in schedule for light porkers makes this class of pig the most profitable. However, more overheads in sows and accommodation for them are involved, and under present circumstances there is sure to be some lag in rebuilding the sow herds. Despite higher overheads the premium on the light porker should be adequate to leave a margin of profit on present costs and as against the production of the heavier pig. Though there are difficulties in getting increased sow accommodation, every effort must be made, through management practices, to save a greater number of pigs from each sow.

The Policy in Operation

In practice the most efficient way of fitting the pig feed requirements to the feed supply available will still be to concentrate on baconer production from litters born in late autumn and winter and on porkers from summer litters. To finish porkers up to 80lb. carcass it will pay to use meals, even at prices as high as £24 a ton, rather than to carry these pigs as stores over the winter.

Farrowing should be concentrated in two periods: May-June (or 2 months before the dairy herd calvings take place) and 6 months later. The majority of the first-litter pigs will be taken to baconer weight, and if they have been given a good start through meal feeding in the creep, they should have reached the desirable baconer weights between 6 and 7 months, when the milk supply is at its peak. When the sows come in with their second litters and require extra feed the sale of baconers at this period will allow sows to be fed more without resort to excessive meal feeding.

Meal Feeding Profitable

With the increased price for pig meat the severe restriction on the use of meals because of their price will be eased somewhat, provided the cost of meals does not go up in the same proportion. In any case the times when meal can be used most profitably are when piglets are in the creep and immediately after weaning and for the next few weeks. Other profitable ways of using meals are in supplementing the sow's ration during suckling, after weaning, to achieve quick recovery of body weight, and (meat meal) during the latter half of pregnancy. Half a pound of meat meal a day may also be used to supplement home-grown crops in winter for pigs which have to be carried over.

The use of meal in the creep will do much toward enabling two litters from each sow to be fattened in a year. Sows do not always farrow to plan and, even if the aim is to have second litters farrowed in November-December, there will be sows which come in late. Litters farrowed in January or up to the middle of February should be finished as light porkers early in June, if they have been given a good start. Some supplement to the failing milk supply may have to be given, through farm-grown crops and meals, but it will pay to provide it rather than to carry the litter through, particularly if most of the sows are farrowing to plan in May and June.

If a bad autumn is experienced and milk supplies have virtually disappeared early in May and no crops have been produced, porkers could still be finished to 60lb. carcass weight at a meal cost (at 2½d. per lb.) of 9d. per pig per day over this last month, when a gain of ¾lb. carcass weight per day (worth 10½d.) should be achieved.

The 60lb. prime porker is worth £3 10s., and though the margin over feed cost for the last month would be very slight in the case quoted, it would pay better to finish pigs to 60lb., if the supply of pigs for spring was provided for, than to over-winter them, with risk of losses or subsequent poor growth and inferior carcass quality.

Weight and Quality Target

There should be a plan to produce all pigs within one of two fairly narrow weight ranges, say, 65-80lb. and 145-155lb. The more uniform killing weights are within the desirable weight ranges the more can the trade rely on quality in carcasses. Values can be affected by this factor alone, and much more attention should be given to it than has been the case in the past. Use of weighing scales, to ensure that pigs are marketed at the right weight, will quickly pay dividends.

The weights mentioned are, broadly, the most suitable for trade requirements, and though at present the same rate per pound applies over wider ranges than those quoted, preference for narrower ranges nearer to the "ideal" is likely to become effective, through differential price, as markets become more fully supplied.

Though differentials have been established largely on weight suitability for the trade requirements, there is a substantial penalty for second grade within each weight range. Carcasses may be graded second quality for lack of condition, for excessive fatness, or for fat which is soft or discoloured. Malformed or blemished carcasses which in the opinion of the grader do not reach the standard required for prime grade may be designated second quality.

The prime grade is still a very wide one and within it there is a considerable variation in suitability both in degree of fatness and general type. As consumers become able to exercise choice more freely differentials inevitably must be applied on quality as judged on these grounds.

In addition to breeding more pigs producers should take steps to ensure that the breeding animals they use have commercial qualities. The test of this lies in such stock being able to breed commercial pigs of high quality. There are ample means of checking this through the Carcass Quality Evaluation Scheme, competitions, or private inspection of carcasses on the hooks. If when selecting breeding stock purchasers insist on breeders supplying information on carcass quality and would be prepared to pay a premium for stock whose worth is proved on the progeny test, the foundation of progress will have been laid.

Farming on the "Tarry" Soils of North Otago

By T. A. SELLWOOD, Instructor in Agriculture, Department of Agriculture, Gisborne.

AN extremely fertile, intensively farmed area of approximately 12,000 acres extends south of Oamaru to Kakanui and Teschemakers and includes the Waiareka Valley and Enfield. The soils are derived from limestone and basaltic tuffs, which occur throughout. The word "tarry" very aptly describes the dark, sticky-textured material which, despite the problems in cultivating it, is noted for the yield and quality of field and market garden crops produced on it. Though there has been a noticeable trend toward market gardening during the past few years, mixed farming is still the principal occupation on the soil type under discussion.

THE climate of North Otago is generally satisfactory for crop production; the average annual rainfall is approximately 22in. (being recorded on 75 to 100 days) and the annual sunshine about 1800 hours.

The soils are generally well drained, on undulating to flat country, and they lie well to the sun, which makes them particularly valuable for the production of early potatoes and lettuces, as they are relatively free from frost. Frost damage has occurred, however, during October and November, after a late fall of snow on the Kakanui Range.

Soil Types

The tarry soils are derived from limestone and lime-rich basaltic tuffs. A tuff is a volcanic deposit which was erupted into the sea at the same time as the limestone was accumulating and consequently the two formations are inter-bedded and the soils derived from them are found side by side in the field. These two rock formations weather to form heavy, sticky soils with a high lime content. An annual rainfall of 22in. is insufficient to leach the lime from the soil as occurs in the heavier rainfall districts. The dark colour of the topsoil together with heavy texture give rise to the very appropriate local name of "tarry soils".

A typical soil profile of Waiareka Clay Loam is 9in. of dark brown to black clay loam with good granular structure and 9in. of greyish brown clay loam on volcanic tuff.

Where limestone is the parent material Oamaru soils are formed; the subsoil is reddish brown and the profile often contains small pieces of limestone.

In some areas, notably west of Oamaru, the soil pattern is more complex. Lighter soils formed from wind-blown loess occur in patches throughout the tarry soils.

The tarry soils are very fertile, as in addition to a high lime content they are also well supplied with potash and phosphate. Owing to the heavy texture of the tarry soils, special care is required in handling them.

The accompanying map shows the distribution of Waiareka and Oamaru soils.

Cultivation

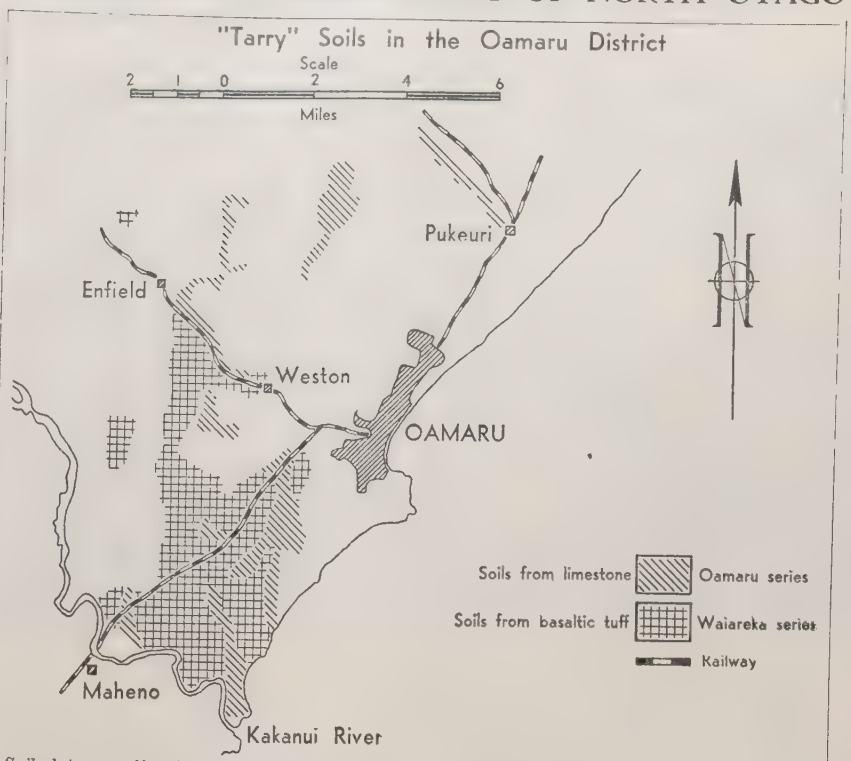
These soils if worked when wet become very sticky and when dry they open up with a network of cracks, so that particular attention must be given to time of handling and selection of implements to be employed. It is generally agreed that the correct time to work the soils is late summer and early autumn, as after they have been ploughed and top cultivated the benefits of frost and winter weathering are secured. Under these conditions a good seed-bed can be prepared with the usual implements on the now friable soil. Both the plough and the rotary hoe can be used successfully for breaking in the soils, the latter becoming more popular as market gardening increases in importance.

Farming Practices

Excellent yields of good-quality crops of wheat, potatoes, rape, and chou moellier, grown under a mixed farming rotation, are secured from these high-fertility soils under efficient management. The district is suitable for production of early as well as main-crop potatoes, while good stands of lucerne and mixed pastures can be readily established and maintained. Wool and fat-lamb production as well as small-seed growing from specially managed pastures are features of the area, and the provision of oats and short-rotation ryegrass to supply greenfeed is normal practice. Pastures and crops are usually sown in autumn to have them well established and able to cope with possible dry spells in September and October. Spring-sown areas often fail to withstand these unfavourable conditions, although at times spring sowings are still continued. High stock-carrying capacity and seed production are secured by

HEADING PHOTOGRAPH: Gartons Onward oats being harvested from the windrow.

FARMING ON "TARRY" SOILS OF NORTH OTAGO



Soil data supplied by the Soil Bureau, Department of Scientific and Industrial Research, Timaru.

maintaining pastures for 4 to 5 years, as by the end of this period the harmful effect of dry summers and grass-grub attack has become obvious. The wide range of crops entered for certification each year in this district is shown by the fact that in the 1947-48 season there were 187 areas of a total of 1943 acres consisting of Montgomery red clover, perennial ryegrass, white clover, wheat, short-rotation ryegrass, cocksfoot, cowgrass, Italian ryegrass, and potatoes.

A common rotation is out of lea to a cruciferous crop such as chou moellier, kale, rape, turnips, or swedes, followed by oats or barley and finally pasture. Other cash crops included in alternative rotations are garden and field peas, linseed, potatoes, and a small acreage in mangolds.

Pasture seed mixtures show some variation, but a general sowing is 20 to 25lb. of perennial ryegrass with 2 to 3lb. of white clover per acre. As seed production is practised, either Certified Government Stock or Pedigree lines are sown, which give high carrying capacity pastures and profitable seed harvests from favourably associated crops which can be managed very efficiently to provide maximum grazing and high-quality seed production as desired.

Montgomery red clover is sown down with 8 to 10lb. of Italian ryegrass or with the same quantity of a low-germinating line of perennial ryegrass. Ryegrass is included to provide cover during the early establishment and for early feed; the area soon becomes dominantly red clover, which is managed principally for seed production. One disadvantage of Montgomery red clover is its lateness in maturing, and for this reason there is a tendency for it to be replaced by cowgrass, which, being earlier, can be harvested under more favourable weather conditions.

Special-purpose sowings of Italian or short-rotation ryegrass to provide autumn and early-spring feed are regularly made and high production is secured in the area.

Wheat Production

Wheat is regularly grown after lea which has been ploughed early in spring, cultivated through the summer, and sown during April or May. This thorough preparation of high-fertility land gives excellent yields, the variety Dreadnought being most popular, with a smaller acreage of Cross 7. The former, which shakes easily, is harvested with the binder and stooked or windrowed and picked up, though if conditions are exceptionally favourable, it may be direct headed. As Cross 7 will remain standing 6 weeks after binder ripeness, it fits in well with Dreadnought, thus allowing the farmer to concentrate on harvesting the Dreadnought and to follow with the Cross 7.

Fat-lamb Production

Romney and Romney-cross ewe flocks vary in number from 350 to 550, depending on the relative areas in pastures and cash crops. The system of buying 2-tooth ewes to be retained for about 3 years or of replacing old ewes annually is generally practised. Southdown rams and a proportion of Border Leicesters (for rape-fed lambs) are put out during March and April and lambing begins in August. The first draft of lambs from the mothers is taken early in January and the second draft in February and early March, just before weaning. The remaining lambs are fattened on rape. Pasture management is generally good, the ewes being maintained on well-grazed swards (on which cattle are not required to control flush growth), greenfeed crops, hay, chou moellier, and some turnips and swedes. Ewes are maintained in good condition, the lambing percentage is high, and good weight, high-quality lambs are produced.

Typical cracking of tarry soils which occurs in summer.

Milk Production

Liquid milk for Oamaru and cream for butter manufacture are produced by Jersey, Jersey-cross, Friesian, and Shorthorn herds, which range from 20 to 60 cows per holding. Supplementary feed in the form of meadow and lucerne hay and mangolds is required for 6 months each year, and consequently haymaking and root-crop production are of particular importance. Lucerne does well under local conditions and, as farms are generally fully mechanised, good-quality fodder is secured. Pick-up balers are operated, but some farmers still prefer to stack unbaled material. Mangolds are usually sown in September, the popular varieties being Long Red, Intermediate, and Golden Tankard, from which good yields are secured. They are fed out with hay during winter and early spring.

Typical Farm

A holding on this soil type near Weston, about 6 miles inland from Oamaru, consists of 428 acres of freehold in conjunction with 111 acres of leasehold land on which mixed farming, involving fat-lamb and wool production, cash cropping, and small-seed growing, is conducted.

The rotation followed, a 10-year one, is as follows: First year, out of lea for wheat; second year, rape; third year, greenfeed (Algerian oats or ryecorn) and chou moellier; fourth year, peas; fifth year, pasture. The period in grass is governed by the adverse effect of dry conditions and incidence of subterranean grass caterpillar (porina or *Oxycanus*), but is about 6 years.

Of the 428 acres of freehold land there are 224 acres in pasture, 70 acres in greenfeed and chou moellier, 50 acres in wheat, 20 acres in rape, and 14 acres in lucerne. On the 111 acres of leasehold 60 acres are in wheat and 51 acres in pasture.

Wheat

Lea land for wheat is skim ploughed in December and left for about 2 months, depending on weather conditions; it is then double disced both ways, harrowed, and ploughed to a depth of 6in., double disced, and harrowed again. Under favourable weather conditions a good seed-bed is obtained and Cross 7 wheat is sown in April-May at the rate of 2 bushels per acre with 1 2/3cwt. of reverted superphosphate. The crop is direct headed, giving an average yield of 60 bushels per acre of milling-quality grain, and the stubble is burnt off.

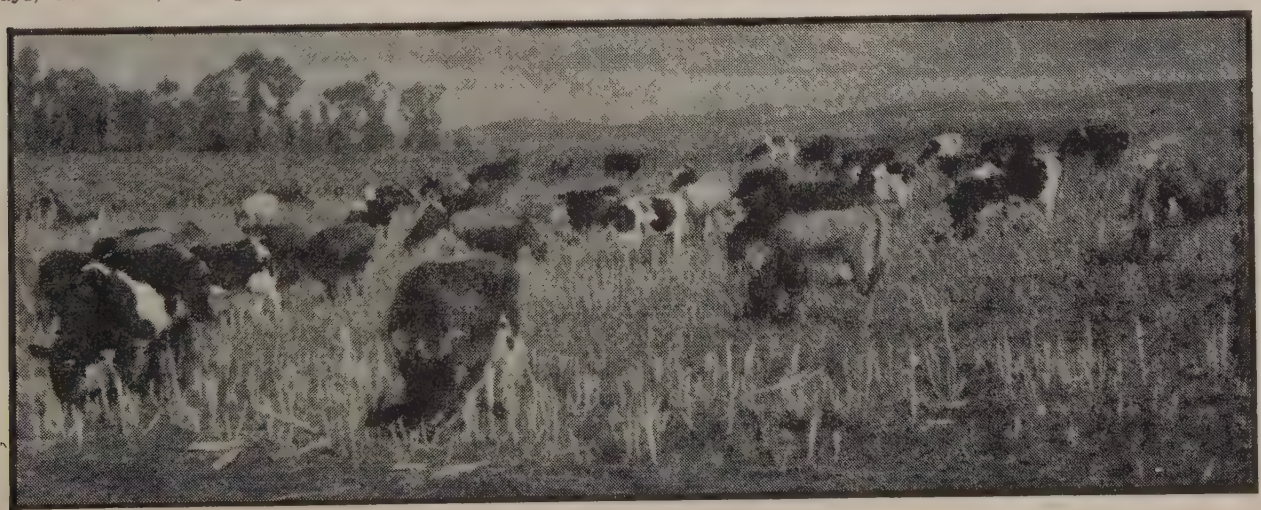
In the past 10 years the area in market gardens on the tarry soils of North Otago has been increasing steadily; now approximately 700 acres are being used for market gardening.

Rape for Lamb Fattening

For rape the burnt-off area is ploughed to a depth of 5in. in March or early April and is then left in fallow unless weed growth has to be checked by working over it with pointed cultivators. In October the land is given two strokes with the harrows and rolled, after which Broad Leaf Essex rape is sown at 4lb. per acre in 7in. drills with 1 2/3cwt. of reverted superphosphate. Feeding off in breaks is begun early in February, and in a normal year 25 lambs per acre are fattened, the first draft being taken between February 20 and 25. The remaining lambs and culled ewes are carried on the rape, but all are sold fat by mid-March, after which the crop is used for flushing ewes.

Greenfeed

In the first week in April the rape land is ploughed to a depth of 5in., double disced, harrowed, rolled, and sown in greenfeed, either Algerian oats or ryecorn; the latter is becoming more popular owing to its rapid establishment and recovery after grazing. Algerian oats are sown at 3 bushels and ryecorn at 2 bushels per acre with 1 2/3cwt. of reverted superphosphate. As shearing is completed a month before lambing, ewes are grazed on greenfeed for 2 or 3 days after shearing in July-early August; they are then alternated between greenfeed, supplemented with chaff and lucerne hay, and chou moellier.



Dairy farming for town-milk supply is practised on the tarry soils of North Otago. Supplementary feed is required for about 6 months of each year and chou moellier, upon which the herd shown above is grazing, is popular.

FARMING ON "TARRY" SOILS OF NORTH OTAGO

Areas on the tarry soils of North Otago are set aside for the production of small seeds. This is a paddock of Pedigree white clover closed for seed production on the farm near Weston which is described in this article.

In October the greenfeed area is ploughed to a depth of 4in., cultivated to check weed growth, double rolled, and sown in mid-December with 4lb. of chou moellier with 1 2/3cwt. of reverted superphosphate per acre. Feeding off begins in July and the crop will carry 40 ewes per acre when supplemented with hay and greenfeed; feeding is completed at the end of August.

Pea Crop

For peas, the chou moellier stalks are mown and the area double disced and ploughed to a depth of 5in., harrowed, rolled, and sown in October with the Partridge or Prussian Blue variety at 3 bushels per acre with 1 2/3cwt. of reverted superphosphate. The area is rolled after sowing, and when the peas are about 1in. high they are harrowed once each way to control annual weeds. The crop is direct headed, Partridge yielding 25 to 30 bushels per acre and Prussian Blue 30.

Pasture

In preparation for sowing down in pasture, land after peas is ploughed to a depth of 6in. and winter fallowed, after which it is disced and harrowed once a week during December-January to check weed growth. A week before sowing down in February 1 ton of carbonate of lime and 1 2/3cwt. per acre of reverted superphosphate are applied broadcast and harrowed in. The area is then rolled, the pasture seed mixture broadcast, and the land harrowed to break the surface crust, which tends to form on this soil type. In selecting the seeds mixture grazing is the main consideration, but grass and clover seed production are also kept in mind. A typical dual-purpose sward is sown with 30lb. of Certified Pedigree or Mother perennial ryegrass, plus 3lb. of Government Stock or Pedigree white clover per acre, while on a cocksfoot area 15lb. of Certified seed of this species is sown with 3lb. per acre of white clover. On hilly country not suitable for seed production the following mixture (Certified seed, with the exception of crested dogstail) is sown:—

	lb. per acre
Perennial ryegrass	20
Short-rotation ryegrass ..	10
Cocksfoot	5
White clover	3
Montgomery red clover ..	3
Crested dogstail	1
Total	42

On shady faces 5lb. per acre of timothy is added to the mixture.

Fields are from 25 to 40 acres and the ewes are divided into two flocks for efficient grazing management on the rotational system. Surplus growth is harvested for hay or, on specially sown areas, saved for white clover (generally second-year swards) or cocksfoot seed production. The average yield of machine-dressed white clover is 100lb. and of cocksfoot 10 bushels per acre. Incidence of blind seed disease has reduced reygrass seed production. Pastures are topdressed each year with 1 2/3cwt. of reverted superphosphate and limed at 10cwt. per acre.

From the lucerne area, which is topdressed with 1 2/3cwt. of reverted superphosphate and 10cwt. of lime each year, three or four cuts of hay each averaging 60 bales per acre are secured annually.

Sheep Management

The flock consists of 650 Romney-cross ewes of which 20 per cent. are culled and fattened each year and replaced by bought-in 2-tooth ewes from Southland. Southdown rams are put out with the ewes at the rate of 1 : 40 between mid-March and April and the average lambing, in August, is 125 per cent. The first draft of fat lambs, which is taken off the mothers in December, when it is 25 per cent. of the total, averages 36lb. The second draft, containing about the same number of similar weights, is cut out when rape feeding is begun in January, and the remaining lambs, fattened on feed, average about 34lb.

Sheep are machine shorn and the average weight of fleece is 10lb., classed into fine crossbred, medium crossbred, and crossbred. Ewe losses average 3 per cent. and losses of lambs are very small, no pulpy kidney being recorded.

Farm Implements

All operations are fully mechanised and the cost of working this particular soil type, necessitating the use of heavy implements, is considered to be 25 per cent. higher than on freer-textured soil. On this farm a diesel track-laying tractor, a wheeled tractor using kerosene, and a full range of heavy-duty implements are required to carry out the programme described, the labour consisting of the owner, one tractor driver, and additional seasonal help.

Market Gardening

The development of market gardening in the last 10 years has been remarkable and at present there are from 600 to 700 acres, mainly on the sunny slopes, devoted to vegetable production. Undoubtedly the establishment during the war of a services' vegetable production unit, on which a wide range of crops was produced successfully by the Department of Agriculture, has given impetus to this method of land utilisation. The present system is to arrange a short-term lease, usually 3 or 4 years, with farmers who at the end of the term continue with cropping, fat lambs, and seed production. A very wide range of vegetable products is railed to Oamaru or Dunedin markets and there are indications that this type of farming will increase. It undoubtedly results in intensification of production and closer settlement without depletion of soil fertility caused by inefficient management.

Future Trends

It is possible that the most profitable utilisation of this peculiar soil type has not yet been discoverd, but the trend from extensive utilisation in the form of cash cropping and fat-lamb production to intensive vegetable production appears to be satisfactory. Since climatic conditions remain fairly constant, the problem of securing maximum returns depends chiefly on methods of soil cultivation and the growing of crops giving highest yields to supply immediate demand. In this connection the type of farming will, no doubt, be governed mainly by how fat-lamb and wool prices compare with returns from cash crops, dairy products, and vegetables. On present indications an increase in the acreage in market gardens, the products from which are in constant demand, appears certain in the fullest exploitation of the tarry soils.

Acknowledgment

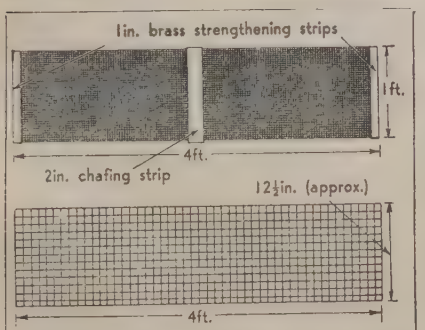
The assistance of officers of the Soil Bureau, Department of Scientific and Industrial Research, Timaru, in supplying data on soils is acknowledged.

Self-clearing Honey Strainer

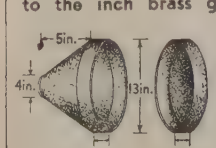
STRAINING heavy-bodied honey has always been a problem in the Auckland district and beekeepers who have not the facilities for warming the combs before extraction have great difficulty in keeping the strainer free from blockage; unless some form of heat is used this trouble will persist to some extent with all strainers. In this article D. Roberts, Apiary Instructor, Department of Agriculture, Auckland, describes a honey strainer capable of handling even heavy-bodied manuka honey, when warm from the hive, very satisfactorily and heated honey with the greatest efficiency.

IN the production of extracted honey efficient straining is of the greatest importance and commercial beekeepers have tried many methods of straining in their endeavours to ensure that all foreign matter and wax particles are completely removed. If warming of honey before or after extraction is not possible, clogging of the strainer mesh is frequent and delays in extracting while the straining material is cleaned or replaced are a regular occurrence.

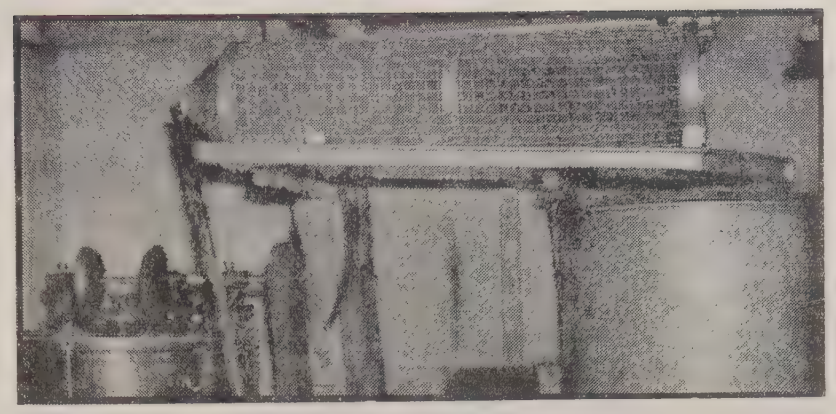
The strainer described in this article was designed by Mr. G. B. Sharp of Matakana, Northland, with the aim of obviating clogging and has proved highly efficient. The capacity of the strainer is sufficient to deal with seven to eight supers of manuka honey averaging 45lb. a super per hour, a daily total of 1¼ tons, and this is the quantity handled regularly by Mr. Sharp's strainer.



Upper—Straining cylinder of 40 to 50 to the inch brass gauze. Lower—Supporting cylinder of 1in. mesh 6-gauge tinned steel wire.



At left—Conical end cover and closed end cover.



Strainer mounted on wooden cradles above the tray.

The success of this design is attained through the large straining area provided and in the method of use. The strainer is cylindrical and 4ft. long by 1ft. in diameter, providing a straining surface of approximately 12 sq. ft. The strainer is supported on two wooden cradles which rest in a tinned steel tray 5ft. long by 1ft. 6in. wide by 3in. deep. The tray tapers inward for the last foot of its length to an opening 2½in. wide. The tray and strainer are given sufficient inclination to cause a fall of 3in. in the length of the tray.

Use of Strainer

Honey is pumped from the extractor into the open end of the strainer, whence it flows through the mesh and into the tray, then running down the tray and out through the opening at the tapered end. A further small strainer of the basket type is suspended within the honey tank to remove any material that may be caught in the honey while it is passing down the tray. If the portion of the wire mesh in use tends to become blocked, the strainer is turned by hand only sufficiently to present a fresh surface to the honey. This limited movement is continued until the whole of the straining surface has been used, and then the strainer is turned not less than one half turn at a time by a rapid movement intended to carry any sludge to the top of the straining cylinder. The sudden cessation of movement will cause the sludge to break loose and fall to the bottom surface of the strainer, where it does not hold up free straining for some time until it again works into the mesh of the strainer when the turning action is repeated.

At the end of the day the strainer is removed from the wooden cradles which support it and stood open end downward in a bucket or similar container, when any honey remaining will quickly drain out. The unit is then easily hosed clean, the whole process taking only a few minutes.

Construction of Strainer

The materials required for building the strainer are:—

1 piece of brass gauze 40 to 50 to the inch, 4ft. long by 3ft. 6in. wide.

1 piece of 6-gauge tinned steel wire netting 4ft. long by 3ft. 8in. wide. (1in.-mesh wire fencing is very suitable.)

1 tinned steel end cover 13in. in diameter with flange turned up 2in deep on the inner side.

1 tinned steel conical end cover to taper to an opening of 4in. in a length of 5in. This tapered cover also has a flange of 2in. depth on its inner end.

3 strips of sheet brass, one 2in. wide, 3ft. 6in. long, and two 1in. wide by 3ft 6in. long. The larger strip is soldered to the centre of the gauze cylinder to prevent chafing; the two narrow pieces are fixed to strengthen the ends where they are soldered to the end cover.

1 tinned steel tray 5ft. long which is 1ft. 6in. wide for 4ft. of its length and tapers to an opening 2½in. wide in the last 1ft. of length.

2 pieces of 3in. x 2in. timber from which arcs are cut to form cradles for supporting the strainer in the tray.

Unless beekeepers possess some knowledge of sheet metal work, the services of a plumber or sheet metal worker will be necessary. The piece of brass gauze is first formed into a cylinder 4ft. long and 1ft. in diameter. It is then soldered together carefully at the join so that there is no leakage of honey. The three strips of sheet brass are sweated on to the cylinder, the 2in. wide one in the middle and a 1in. strip at each end, to assist in ensuring that the cylinder retains its shape. The central piece also serves as a chafing strip. Another cylinder is now made from the 1in.-mesh wire netting. This should be made of sufficient diameter to fit freely over the gauze cylinder and at the same time be a neat fit inside the flanges of the end covers. This cylinder of netting is used to tie the end covers securely together and also to act as a support to prevent undue sagging of the strainer gauze. The end covers are then made and sweated into place on the two cylinders. Assembly of the strainer will be simplified if in the construction of the tapered end cover the conical section is made separately from the flanged portion, the conical section being affixed when all other work of assembly is complete. The tray is tapered to a 2½in. outlet so that the honey can be directed into baffles leading into the honey tank, thus helping to prevent the accumulation of air bubbles.

CARE OF LIVESTOCK DURING MAY

Contributed by the Animal Research Division

[*National Publicity Studios photo.*

MILKING MACHINE OVERHAUL

As soon as the cows have been dried off arrangements should be made for the milking machine to be overhauled by an expert. Do not install complicated gadgets, but make sure that all parts of the machine are working efficiently. This will not only ensure rapid, trouble-free milking, but is likely to increase production, and will help to reduce mastitis. The Department of Agriculture's Bulletin No. 260 "Mechanical Milking" should be carefully studied by every dairy farmer.

UNTHRIFTY CALVES

At the first sign of unthriftiness calves should be drenched with phenothiazine, being given the full dose recommended on the label. Drenching, however, will not be effective unless the calves are properly fed. The best feed for calves is good fresh pasture, and this can be provided by rotating the calves through the cow paddocks. Good-quality hay is necessary to supplement the sappy young autumn pasture.

AUTUMN-SAVED PASTURE

In most districts there is still time to provide good winter grazing by shutting up paddocks and letting them grow during autumn and early winter. Autumn-saved pasture is invaluable for early-calving cows. It also provides the best insurance against sleepy sickness in ewes. If necessary, feed silage to cows now to enable some paddocks to be shut up. Once the ewes have been tupped they are all the better for being done fairly hard until 3 or 4 weeks before lambing. This also will enable some paddocks to be spelled. Further particulars regarding autumn-saved pasture will be found in an article in the February, 1949, issue of the "Journal".

PURCHASE OF HERD SIRE

If a new herd sire will be required this year, now is the time to make inquiries. The New Zealand Dairy Board issues a Sire Survey and Merit Register which gives the production of the daughters of all dairy sires which have been surveyed. Unfortunately very few progeny-tested sires are available, but the Register should be consulted and wherever possible a bull by a proven sire out of a merit cow should be selected. Bull catalogues are issued annually by the Herd Improvement Association and these, too, should prove of considerable value to dairy farmers who are looking for herd sires.

INOCULATION OF DOGS AGAINST DISTEMPER

Distemper in dogs can in a very high percentage of cases be prevented by vaccination. This is best done when the pups are 3 to 4 months of age. The virus, which has a short life, is imported from Australia and it is therefore necessary to notify the Veterinarian at least a month before the pups are to be vaccinated.

BLOOD POISONING IN HOGGETS

Blood poisoning in hoggets grazing on turnips is becoming an increasingly important problem. Deaths occur from infection with the blackleg organism, which probably gains entry through the mouth. An excellent vaccine, which confers very good immunity, is now available for purchase in New Zealand. On properties where losses have previously been experienced, hoggets should be vaccinated a fortnight before they are placed on turnips. The nearest Veterinarian or Inspector of Stock should be consulted concerning the method of vaccination

PREVENTION OF SUCKING BY CALVES

Sucking of each other by calves is a habit which should be broken as soon as it is detected. The insertion of a bull ring is effective in most cases.

DAIRY PRODUCE GRADED FOR EXPORT

THE following figures showing quantities of dairy produce graded for export during February and for the 7 months ended February 28, 1951, with comparative figures for the same month and 7-monthly period of 1950, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER

Period	Creamery	Tons Whey	Total	% Inc. or dec.	Total tons in store at end of mth.
February, 1951 .	15,354	317	15,671	—	45,749
February, 1950 .	12,556	291	12,847	—	40,813
Inc. or dec. ..	+2,798	+26	+2,824	+21.981	+4,936
For 7 mths. to 28/2/51 ..	123,295	2,318	125,613	—	—
For 7 mths. to 28/2/50 ..	122,134	2,222	124,356	—	—
Inc. or dec. ..	+1,161	+96	+1,257	+1.010	—

CHEESE

Period	White	Tons Coloured	Total	% Inc. or dec.	Total tons in store at end of mth.
February, 1951 .	11,052	6	11,058	—	29,301
February, 1950 .	8,282	2,233	10,515	—	30,162
Inc. or dec. ..	+2,770	—2,227	+543	+5.164	—861
For 7 mths. to 28/2/51 ..	76,103	1,519	77,622	—	—
For 7 mths. to 28/2/50 ..	58,836	16,438	75,274	—	—
Inc. or dec. ..	+17,267	—14,919	+2,348	+3.119	—

If these figures are converted into butterfat equivalent, there is an increase of 1.437 per cent. in butterfat graded for the 7 months as compared with the corresponding period of the preceding season. It should be noted that the above figures refer only to butter and cheese graded for export, and that owing to diversions which may take place from time to time, they are not necessarily a true indication of production trends.

Management of Lucerne in Mid-Canterbury

By R. INCH, Fields Instructor, Department of Agriculture, Ashburton.

LUCERNE (*Medicago sativa*) or alfalfa is a crop that has been grown throughout the ages and has survived until the present time on sheer merit. It is mentioned in Greek and Roman writings more than 2000 years old. Though lucerne is more popular in some places than in others, it appears to be widespread throughout most of the countries of the world. What has made this plant so popular? By studying it a little more thoroughly reasons may be found why it should be grown more generally and why the area in the crop should be extended to include a larger range of soil types. Experience in Mid-Canterbury suggests that lucerne could be used more widely there as a fodder crop.

ALTHOUGH 41 per cent. of the lucerne grown in New Zealand in 1947-48 was grown in Canterbury, only 12.25 per cent. of this amount was grown in Ashburton County.

Twenty years ago only a few acres of lucerne were grown in Ashburton County, but the area had increased to nearly 1500 acres by 1945-46 and to over 2300 by 1947-48. Even so it is considered that the area in this county devoted to lucerne is still too low and that there is room for a considerable increase in stands of this plant throughout this county.

TOTAL AREAS IN LUCERNE

	1928-29 acres	1938-39 acres	1945-46 acres	1947-48 acres
New Zealand total ..	30,808	37,023	41,416	46,303
Canterbury ..	3,474	8,733	16,840	19,368
Ashburton County ..	50	444	1,452	2,373

An analysis of the Canterbury figures for 1947-48, dividing the province into 5 areas between the main rivers and comparing the areas in lucerne with the total areas cut for hay or silage, gives the following results:—

District	Area in grass, clover, or lucerne cut for hay or silage	Area in lucerne	Percentage in lucerne
	acres	acres	
North of Waipara River	8,109	4,596	56.67
Between Waipara and Waimakariri Rivers ..	12,890	2,977	23.09
Between Waimakariri and Rakaia Rivers ..	21,505	5,853	27.21
Between Rakaia and Rangitata Rivers ..	9,806	2,373	24.19
Between Rangitata and Waitaki Rivers ..	15,164	3,569	23.53
Total for Canterbury	67,474	19,368	29.59

On suitable soil lucerne gives remarkable growth and better production than any other crop. What does not appear to be so readily accepted, however, is that, area for area and year after year, lucerne will give similar results on the lighter soils. Though the heavy yields obtained from the better classes of land cannot be expected on light soils, it would appear that production from lucerne on light country will compare favourably with that from ordinary pastures under similar conditions.

Lucerne is at present being grown successfully on most types of soil in Mid-Canterbury and stands may be seen scattered throughout the county from the foothills to the sea. It has been laid down with a variety of cover crops, but, on the average, the best results have been obtained when it is sown alone on a well-fallowed seed-bed. It does not thrive on land where the ground water level is high or on sour acid soils, but apparently does well on any other class of country. In Mid-Canterbury lucerne is growing on rich river silt, on areas with heavy clay subsoil, on light plains land, and on all soil types within this range.

There have been failures in establishment, as is only natural. There have also been failures with other crops. This can be expected, as no matter how well a field is prepared, weather and other circumstances have a great influence on the final result. Adequate preparation of the seed-bed, liberal use of lime, and inoculation of the seed are three factors affecting successful establishment. Neglect of one or more of these tends to reduce the likelihood of success.

A newly established lucerne stand in the Anama district.

Value of Lucerne

Lucerne hay keeps well and if harvested in good condition, will open up well after several years' storage. It is highly nutritious and even when fed alone to stock it provides a good maintenance ration.

On the old Ashburton Experimental Farm some 20 years ago experiments were conducted on the effect of feeding lucerne chaff to sheep. This practice gave excellent results, it being found that a ration of 2½lb. per head per day given to breeding ewes running on pasture on light land brought them through the winter in good condition. Though lucerne chaff is now seldom used, the value of lucerne hay is well recognised.

On suitable soil types under efficient management a stand of lucerne will last for many years. W. S. Hill in "The Culture of Lucerne" states that a vigorous stand in Canterbury produced regular crops of hay for 28 years, but probably this was an exception. One stand sown in the Lagmhor district in 1936 has produced 5 to 6 tons of hay per acre each year in 3 or 4 cuts and is still in full production. Generally the profitable life of a stand on good land may be taken as 8 to 10 years, by which time it will probably pay to renew it. On lighter land 6 to 8 years is all that can be expected for maximum production, and it will be necessary to plan to have a further area coming on after that time. Where hay is the major consideration it is more profitable to cut a good crop than a poor one, but a stand that is not good enough for hay may still be useful as grazing for

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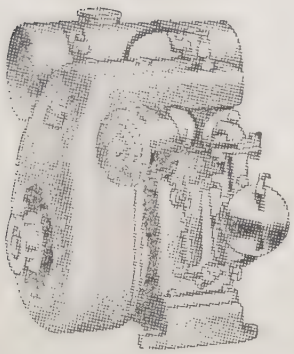

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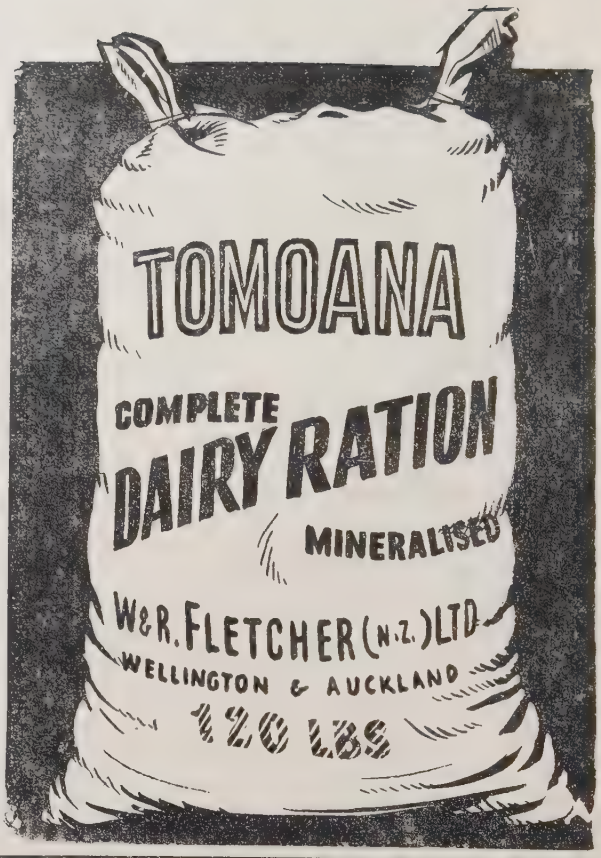

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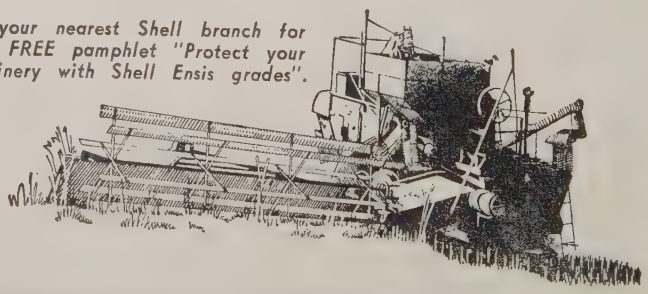

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another year or so. It is safe to say that nearly all the stands in the county were laid down primarily for hay. It is also safe to say that most of these stands have been grazed to some extent at different times of the year. This grazing takes place mostly in autumn, when a few sheep are turned into the paddock to clean up growth that is not sufficient to utilise as a hay crop. Lucerne grazing has been found very useful for carrying a few killers or for topping off the last draft of lambs when other feed is short. Very few farmers have laid down stands primarily for grazing. Lucerne is first and foremost a hay crop, but it may be of interest to recall the work in this connection investigated at the Ashburton Experimental Farm and to give some details of different experiences and practices of management under grazing that are being carried out in various parts of the county at the present time.

Ashburton Experimental Farm

Experiments with grazing of lucerne were carried out on the Ashburton Experimental Farm at the same time as the trials with feeding lucerne chaff, and the results of these trials also give some interesting results. A report ("The New Zealand Journal of Agriculture", December, 1928) on a stand sown in 1921 and grazed during spring and summer every season since its establishment reads:—

> It would be idle to state that lucerne stands used exclusively for grazing are not detrimentally affected thereby, however careful the management. However, **the degree of damage is not greater than one would expect, and in most cases is quite in proportion to the amount of grazing done.** Although apparently unaffected for the first three or four seasons, grazed areas have then shown a falling off in carrying capacity. Spring growth is slower, and the incoming of grasses and weed grasses is noticeable. Weed grasses, such as barley grass, goosegrass, and hairgrass, are seldom eaten by stock when better feed is available, and they run to seed in autumn and spread rapidly. Stands hayed in summer and grazed in autumn make more rapid growth in spring, and are generally almost entirely free from grasses.

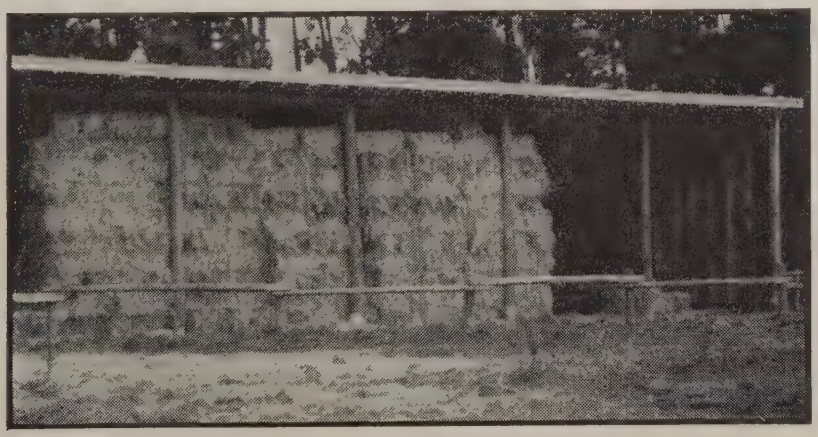
Two years later the farm report ("The New Zealand Journal of Agriculture", October, 1931, page 280) speaking of lucerne says: "A 20-acre paddock of lucerne sown in 1921 is still flourishing. Besides giving a cut of hay, the lucerne provided a large amount of grazing for sheep during the season, despite the dry weather."

Lucerne yields a large bulk of material for hay.

Farmers' Experiences

A 24-acre block at Lauriston on stony silt loam that would normally average about 30 bushels of wheat per acre was sown 12 years ago with 16lb. of seed per acre, with 2 tons of lime 2 weeks before sowing, and 1cwt. of superphosphate with the seed, and has been used chiefly for grazing. The usual practice on this farm is to make hay of the first cut and graze the remainder. The owner has no hard-and-fast rule in this respect and does not study the crop when grazing, but uses it as required by the stock. He prefers to have it more mature than the cutting stage if possible, as he finds that stock do not thrive as well when the plants are growing vigorously and are relatively soft, but he has used it at all stages as required. The field has received a total dressing of 3 tons of carbonate of lime per acre over the years it has been down. At the present time it is far from a pure stand, owing to the ingress of grass and clover, but although no record has been kept of the number of stock carried on the area, the owner states that he is still satisfied with the grazing produced. This farmer has been so impressed with the possibilities of lucerne treated in this manner that he sowed another 28 acres 6 years ago.

In the spring of 1944 a farmer in the Coldstream district sowed 6 acres of lucerne as a hay stand. The following January he sowed a further 10 acres on a light, shingly strip of land adjoining the first block, with the idea of using it as a grazing area. Both areas received 1 ton of lime per acre before sowing, 1 ton in 1946, and 10cwt. in 1948. They also received a dressing of 1cwt. of superphosphate each August. The owner estimates that he has averaged 25 to 30 tons of hay each year off the 6 acres, taken in 3 or 4 cuts, depending on the season. The 10 acres were divided into 3 blocks and grazed rotationally throughout the 1945-46 season, the sheep having a run-off on an old grass paddock. In the following year 6 acres were cut for hay during the first week in November and the balance grazed. After this cut the area was grazed in 3 blocks for the remainder of the season. In the following year hay was taken off the whole area early in November and



Good hay is worthy of a good shed.

A good crop of hay ready for baling.

it was afterward fed very hard. During 1949, owing to lack of moisture, feed was very scarce on this farm and most of the sheep were carried on the lucerne with a run-out on fairly bare paddocks. The farmer states that had it not been for the lucerne, his stock would have been in a very bad way. An inspection of the area in March, 1950, showed that the stand had suffered no ill effects from the grazing and was nearly ready to feed again. This farmer considers that the ideal management is light grazing with a few ewes and lambs from the last week in August, with the main grazing in 3 blocks from October 1 onward. He prefers to graze the lucerne when it is about 9in. high and considers a run-off on to a grass paddock, even a bare one, essential. Up to 150 sheep can be grazed on each block at a time; more than this would foul the herbage. This is the ideal aimed at, but not necessarily adhered to. The requirements of the sheep are the first consideration. This land would normally grow at least 40 bushels of wheat per acre, but, as already stated, the lucerne was sown on the lightest strip on the farm.

Near the Ashburton River at Winchmore an 11-acre stand was established for hay on good soil that was inclined to be wet at some periods of the year. This stand produced 4 good cuts of hay each year for the first 2 years. The weather in spring during this time was very unsettled and considerable difficulty was experienced in harvesting the first cut of hay in good condition. In the third year, as lambing took place, the ewes and lambs were placed on the lucerne to graze. When the mob had increased to approximately 100 it was shifted to other feed and replaced with other newly lambed ewes. It was found that the lucerne increased the milk supply of the sheep and gave the lambs a good start. Grazing was discontinued toward the end of October and 3 cuts of hay were taken from the stand. The early feeding relieved the farmer of the worry of making hay under adverse conditions and also provided good feed for the ewes at a time when it was very welcome. The system was carried on for another 4 years until grass growth became prevalent at the expense of the lucerne and the area was ploughed.

Lucerne for Hay on Light Land

On light land at Hinds an area of 5 acres was sown as a trial in February, 1940. The paddock was fallowed and 2 tons of lime applied before seeding; 15lb. of seed per acre was sown with equal parts of lime and superphosphate at 2½cwt. per acre. Three cuts of hay per year up to 1948 produced a total of approximately 300 bales each year from the area of 5 acres. This is certainly not a heavy crop, but on this class of land it compares favourably with anything else. The area has been topdressed with ½ to 1 ton of lime and 1cwt. of superphosphate per annum and has been grazed very little. On this land sweet vernal is the worst weed, but if this is controlled during the first year, it does not give a great deal of trouble for some time. The results from this trial have been so satisfactory that the farmer has now sown other areas.

Another farmer on very light land on the Maronan Road planted 13 acres about 12 years ago. This has been cut regularly until recently three times a year, averaging about 30 bales per acre for each cut; the best year's return was 2000 bales from 13 acres. Sweet vernal has now invaded the stand, which has been reverted to grazing, the sheep showing a marked preference for the lucerne over the remainder of the pasture. This man has laid down another 40 acres which he has used for grazing with very satisfactory results.

Valuable for Hay or Grazing

Although most lucerne stands are sown primarily for hay, it would appear that more use could be made of the crop for partial or complete grazing. Most crops are grazed at some time during the season, perhaps to finish off a few lambs at the end of the season or to clean up a paddock that is not good enough to cut for hay. Where sweet vernal or other grasses are a problem it may be advisable to hay the stand for the first year to give the lucerne an opportunity to smother out other species. Haying off the first cut in succeeding years will also assist.

On light land a paddock of lucerne is a good investment. In good years it can be cut for hay; in dry years it will stand grazing at a time when other greenfeed is at a premium. It is this insurance quality that makes lucerne so valuable. Lucerne is a lasting crop and as such repays extra attention in preparation of the seed-bed. It responds to heavy dressings of lime probably more than any other crop. Inoculation of the seed ensures that there is an adequate number of the micro-organisms essential to its growth. Inoculation is not a mysterious process, but simply a matter of mixing the culture with a little skimmed milk and applying it to the seed before sowing.

Cutting or Grazing

From the details of management given it will be seen that there is no hard-and-fast rule regarding the cutting or grazing of lucerne. Some methods may give better results than others, but the individual farmer must decide which method will best suit his requirements. Grazing may possibly shorten the life of the stand, but this is counterbalanced by obviating the labour charges involved in making hay and by the value of the crop as greenfeed. Grazing by cattle is not recommended as a general practice, as there is some danger of bloating. Sheep do not appear to suffer this risk to the same extent, especially if introduced to it gradually and never on an empty stomach.

If the crop is treated as ordinary good farm practice dictates, it should find a place on the majority of farms.

It is not held up as a cure-all for all grazing problems throughout the year, but rather as a very valuable crop to be used in conjunction with other greenfeed, root crops, or pasture.

Though this article has referred to the use of lucerne in Mid-Canterbury, there is no reason why the methods discussed should not be applied in any other district where conditions are similar. Field officers of the Department of Agriculture will assist any farmer to establish a stand of lucerne.

Silver Leaf Disease

By A. T. J. WATTS, Stone Fruit Specialist, Department of Agriculture, Dunedin.

SILVER LEAF (*Stereum purpureum* Pers.), sometimes known as silver blight, is a fungous disease which kills many trees and causes considerable loss of crop both in commercial orchards and private gardens. It has been recorded on many kinds of woody plants besides fruit trees, but it is most common on stone fruit and less frequently appears on apples and pears. Small fruits such as gooseberries and currants and trees such as willows and poplars are often infected.

THE name is descriptive of the outward appearance of the disease. As a rule only one branch or perhaps only a lateral is affected at first; the leaves, instead of being a healthy green, become greyish or silvery and may tend to curl at the edges. Often they fall prematurely. The infected branch may die within a few weeks or may remain alive for several seasons, producing silvered leaves each year. Only weak growth is made, and, particularly when the trouble spreads to adjoining limbs, the tree has often a starved unthrifty appearance. In very rare cases an infected tree may recover naturally.

A similar silvering of the foliage is sometimes due to damage by thrips, very small insects which, in feeding, rasp the surface of the leaf; this pest is probably more common on ornamentals such as rhododendron, lauristinus, and acmena than on fruit trees. Thrips infestation can usually be distinguished from silver leaf by the presence of the insects, the absence of the starved appearance, and the fact that normally the leaves do not fall prematurely, nor does the wood die back. Soil conditions also may occasionally cause a temporary discoloration of the leaves.

[*Frank McGregor Photography photo*

Tree with one limb killed by silver leaf.

[*Frank McGregor Photography photo.*

Silver leaf has entered this tree through the dead wood of stubs left at pruning. These branches should have been cut back to a strong side growth or removed entirely, and the wound should have been trimmed and sealed.

Confined to Woody Parts of Plant

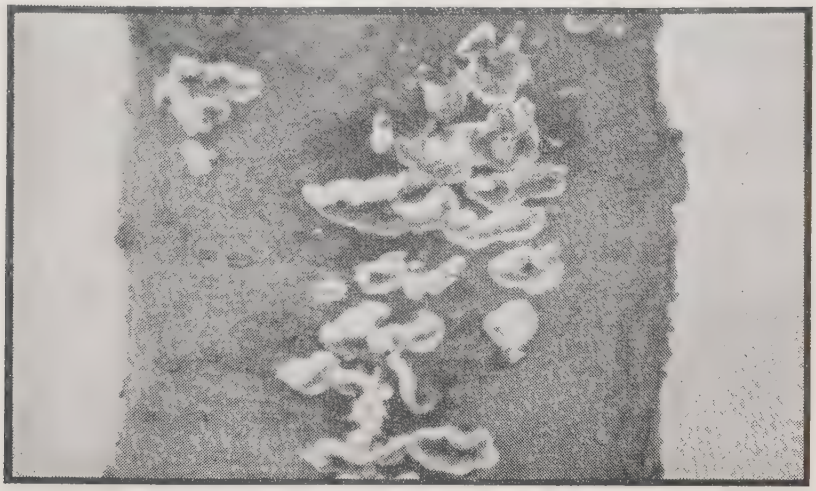
The fungus is confined to the woody parts of the plant, through which the threads (hyphae) ramify, killing the wood and staining it brown. The threads do not enter the leaves, but from their tips is secreted a substance which dissolves cell walls. This finds its way into the sap stream and is circulated through all parts of the plant. In the leaves its dissolving action has the effect of separating the transparent outer layer of cells from the underlying one containing the green colouring matter; it is the thin film of air in this space which causes the characteristic silvery appearance.

After the fungus has killed a branch the threads eventually grow out to the surface, where they form a small shelf-like projection, usually an inch or so across, sometimes white, but usually with a pink or purplish tinge. Within this fructification, or fruiting body, are produced the spores, which are dispersed mainly by wind. A tree infected with silver leaf does not become a menace to its neighbours until the fruiting bodies are formed on the surface of the dead wood.

Spores germinate by sending out a thread which enters the host tissue, where it branches repeatedly, killing the wood cells as it grows through them. This infection thread cannot penetrate healthy bark, but dead stubs or breaks in the bark, such as pruning cuts, broken twigs or branches, or parts injured by insects or implements are common points of entry.

No Control through Spraying

Once the fungus becomes established it is protected by the host tissue and therefore cannot be controlled by spraying. Attempts have been made to kill the fungus by injecting chemicals into the trunk or branches of the tree. The weakness of this method is that anything capable of killing the fungus, which is a form of plant life, will also damage or kill the host. It is not beyond the bounds of possibility that such a substance, sufficiently selective in

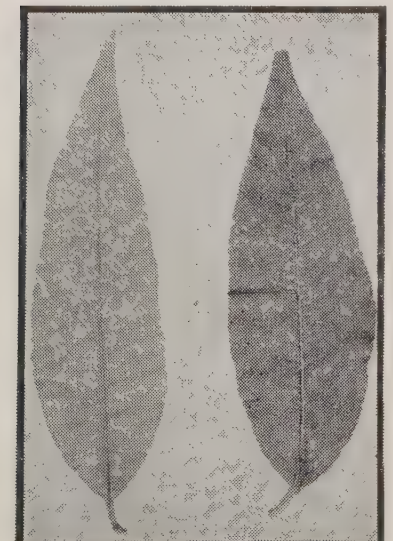


The type of fungus that spreads silver leaf.

its action to destroy the fungus without harming the tree, may be found, but there would still remain the problem of repairing the internal damage to the wood.

Cutting out Infected Parts

Opinions differ as to the advisability of cutting out the infected parts of fruit trees, particularly peaches. Some growers contend that it is better to take the tree out entirely; others say that it pays to leave the tree, provided no fructifications appear, so that the benefit of any crop produced on the healthy portions of the tree for a season or two is secured. The latter may be preferable where, under a replacement plan, young trees are coming into bearing elsewhere. A great deal depends on the extent of the infection when first noticed, the rate of spread from limb to limb, and the amount of wood which is killed outright.



The under surfaces of an infected peach leaf (left) showing silvering and a healthy leaf (right).

If only one branch is infected, its removal may prevent the disease spreading to others and so save the major part of the tree. Although growth of the fungus downward from the point of infection is usually slower than its growth upward, it is important to realise that often it progresses further internally than the foliage symptoms indicate. If when a cut is made the wood exposed looks unhealthy or discoloured, further cuts should be made lower down until the wood appears clean. It is always better to remove a lateral or branch completely or at least to cut it back to a healthy side growth large and vigorous enough to take up the sap flow; to leave a bare stub or to cut back to a weak growth which in all probability will die is inviting further trouble. Removal of infected parts is best done in summer; not only are they more easily seen then than in the winter, but in addition healing is quicker.

Preventive Measures

As cure is impossible, particular attention should be paid to preventing infection. Apart from dead wood on infected fruit trees, the disease can be spread from heaps of prunings or from stumps and branches of dead shrubs or trees in the vicinity. All such material should be destroyed by burning. In addition to the elimination of these obvious sources of infection it is essential to protect all parts of the tree where the bark may be damaged, including pruning cuts at least down to 1in. in diameter, and smaller if practicable. Saw cuts should be trimmed smooth and all wounds then covered with a protective layer (bituminous paint is probably the most efficient, but crude petroleum jelly is also satisfactory) which will keep out wood-rotting organisms as well as the silver leaf fungus. The treated parts should be inspected periodically, as a perfect seal must be maintained until the wound has calloused over.

BOOK REVIEWS

"Soil Conditions and Plant Growth": Sir E. John Russell

SINCE it was first published in 1912 "Soil Conditions and Plant Growth" has been recognised as an authoritative text book covering knowledge of the soil as a medium for plant life. The eighth edition, which has been revised and largely rewritten by E. W. Russell, will be welcomed by students, teachers, and research workers and by farmers and gardeners who are deeply interested in the study of plant growth.

The text, which is well supplied with references gives a critical account of current knowledge. It covers plant nutrients, plant growth, and the composition of soils; micro-organisms and soil animals; humus and its functions; nitrogen fixation; water movement in soils; and soil formation and soil management.

The book answers the need for soil knowledge, so aptly phrased by Sir John in the opening paragraph of the first edition of the book which reads: "In all ages the growth of plants has interested thoughtful men. The mystery of the change of an apparently lifeless seed to a vigorous growing plant never loses its freshness, and constitutes, indeed, no small part of the charm of gardening. The economic problems are of vital importance and become more and more urgent as time goes on and populations increase and their needs become more complex."

—*P.W.S.*

Longmans, Green and Company Limited., London. 35s. net.

Farmer and Stock-breeder Year Book 1951, Farmer and Stock-breeder Publications Limited, London. 7s. 6d. net (postage 6d.).

Ten experts survey current agricultural problems and technique in this issue and the authoritative machinery review is an outstanding feature of the publication.

The pictorial section includes 64 pages of animal pictures. Much of the reference material is of particular interest only to the British farmer, but statistics of stock, crops, labour and machinery, sales and prices, averages from leading pedigree sales, weekly market prices, fixed prices and typical rations for cattle, pigs, and poultry may be of value to the student and of interest for comparative purposes.

SUBSCRIPTION RENEWALS

Renewals of subscriptions to "The New Zealand Journal of Agriculture" should be paid to the nearest office of the Department of Agriculture. Subscribers can ensure continuity of delivery by paying their subscriptions as soon as possible after receiving their renewal notices and at least 1 month before the old subscription expires. When payment is made the renewal notice should accompany the subscription to ensure that the correct details are recorded.

Treatment of Scaly Leg in Household Poultry

THE condition scaly leg in fowls is commonly believed to be a sign of old age, but even young pullets can have it. It does exaggerate the semblance of age, and it tends to arouse repugnance against eating the flesh of a badly affected hen, but it is caused by a mite. In this month's article for the household poultry keeper W. L. McIver, Poultry Instructor, Department of Agriculture, Hamilton, explains why scaly leg occurs seldom on commercial farms but frequently in household flocks and describes a simple treatment for the condition.

[*Fraser Niederer photo.*

A CHARACTERISTIC and common poultry affection, scaly leg is caused by a small mite that burrows under the scales of the shanks, makes its home there, and causes irritation. This condition, erroneously called elephantiasis by some people, is mildly infectious in certain circumstances.

In adult fowls it shows up plainly as a thickening of the shanks and toes and as large, whitish-grey, dirty-coloured encrustations. These deposits are rather chalky in consistency and force up the level of the affected scales. It is not prominent in young birds because in its early stages only very careful examination will show minute blisters under the scales. The blisters burst, exuding a straw-coloured serum, which dries and assumes the appearance well known to many household flock owners.

The scales may be shed and the encrusted shanks may develop to two or three times normal thickness. The irritation caused is most severe at night, when the hens are not active, but soreness occurs only in very severe cases. The irritation can bring about loss of sleep, ill health, and a reduction in egg yield.

[*Fraser Niederer photo.*
Scaly leg can be cured by frequent dipping of the shanks in a container of one of the mixtures recommended in this article.

Spread of Mite

Scaly leg does not often occur on commercial poultry farms, and the major reasons for its frequent presence in backyard flocks are insanitary conditions and early transmittability.

Regrettably, many household flocks are not housed or managed with more than a fraction of the attention and care given to commercial fowls. The farmer cleans out housing regularly and, what is more important in reducing the incidence of scaly leg, does not run growing chickens and adult birds together. The spread of the mite is greatly reduced if unaffected birds are not mixed with older hens which have the trouble until they are fully grown, when they can be permitted to run with the old hens for years with little risk of developing the condition. On the other hand, if chicks are reared by a mother hen with it, she will certainly give it to all the brood.

Heavy breeds are more likely to be infested than light breeds. Growing White Leghorn pullets of, say, 3 months of age might not catch the trouble from older fowls when they are allowed to run together, but Black Orpington pullets would be fairly sure to contract it.

Preventing the Condition

This explanation gives three hints about how to prevent rather than cure scaly leg: If a broody hen is used as a mother, treat her for the condition before she is set on the eggs or given the chicks; do not run heavy- and light-breed chickens together; and do not mix young and old birds. Important as sanitation is, following these rules does more to stop the spread of infection than the utmost cleanliness.

Probably because scaly leg usually does not cause mortality, few householders bother to try curing it, but allowing the trouble to continue is unwise. When the incidence is low the condition is very mildly infectious, but when it is high the spread is far greater until the stage is reached at which every bird not only catches it but has it badly. The appearance then becomes repulsive and the illusion is created that the flesh of affected hens is unfit for eating. If the hens are sent to a mart for disposal, this will reduce bidding and lower the price.

Cure is Simple

Scaly leg can be cured simply by dipping the shanks into a container of one of the following: Kerosene and oil in equal parts; old car-sump oil; 1oz. (2 tablespoons) of phenol to 1 pint of water; an emulsion of ¼ gallon of kerosene, ½lb. of soap, and 1 gallon of water; or 1 part of kerosene and 2 parts of linseed oil. Because of the burning action of kerosene care must be taken that any mixture containing it does not touch the skin. The treatment can be done with pure kerosene, but because of its severity it is better mixed with some kind of oil.

Instead of the legs being dipped in it, the mixture can be painted on with a brush.

The number of treatments needed depends on the severity of the condition and the length of time for which the fowls have had it. The treatment should be repeated every few days until it is seen that a cure is being effected. Though it is more easily carried out at night, when catching the fowls on the perch is simple, treating the birds then is inadvisable because of the increased danger of kerosene spreading on to the skin.

In bad cases it is advisable to prepare the shanks for treatment by softening the scales. The shanks are soaked in warm, soapy water and the outer encrustations scrubbed off with a stiff-bristled brush.

Treating the first few cases recognised in the poultry run saves a great deal of labour later.

Fig. 16—A (rosette) and B (flowering stem) of ragwort (*Senecio jacobaea*). C: Cape ivy (*Senecio mikanioides*).

Fig. 15—Rangiora (*Brachyglottis repanda*).

POISONOUS PLANTS IN NEW ZEALAND

THIS is the seventh section of a series of descriptions of poisonous plants which grow in New Zealand by H. E. Connor, Botanist, Department of Scientific and Industrial Research, Wellington. The series is appearing monthly in the "Journal", and glossaries to be used with the series were published with the first section, which appeared in the October issue.

DICOTYLEDONS

Ericaceae

Rhododendron. *Rhododendron* **spp. (Fig. 14)**

Botanical description: Habit—Evergreen or deciduous shrub, rarely a tree. **Leaves**—Alternate, short - petioled, entire. **Flowers**—Pedicelled, in terminal umbel-like racemes, and in few-flowered clusters; variously coloured.

Habitat: Cultivated as an ornamental plant.

Distribution: In gardens; not known to escape.

General: Poisonings of stock caused by rhododendrons are not frequent in New Zealand, but in Europe and, especially, in the United States of America, where the plants occur in grazing areas, rhododendron poisonings are common. Sheep, cattle, horses, and goats are known to be poisoned by these plants. In New Zealand plants or clippings from the garden are most likely to be responsible for stock losses that may occur.

Symptoms of poisoning are salivation, vomiting, abdominal pain, depression of respiration, weakness, and staggering gait, death resulting from respiratory failure.

Poisonous principle: A neutral substance, andromedotoxin, is present in rhododendrons.

Compositae

Rangiora, Wharangi. *Brachyglottis repanda* **Forst. (Fig. 15)**

Botanical description: Habit—Shrub or small tree 8 to 20ft. tall, densely clothed with soft hairs. **Leaves**—4 to 12in. long including petiole, broadly oblong or ovate-oblong, irregularly lobed or sinuate, dull green and glabrous above, tomentose beneath. **Flowers**—In large drooping panicles, which exceed the leaves; 1/6in. long. (New Zealand.)

Habitat: All classes of bush.

Distribution: Abundant from North Cape as far south as Kaikoura and Greymouth.

General: Though rangiora is seldom eaten by cattle or sheep, it is known to cause a drunken effect in horses, which will eat the plant. Poisonings by rangiora are rare, but lethal cases have been reported. Horses seem to favour the large flower heads, which are more toxic than the leaves, and when they have succumbed to the toxic effects of rangiora are often said to be "wharangied". From time to time rangiora has been alleged to have caused poisonous honey, but this claim has not been substantiated. There is also on record a recent case in which two schoolchildren were made severely ill by chewing a gummy exudate from rangiora. In trials at the Animal Research Station, Wallaceville, flowers fed to a sheep over a period of 7 days proved toxic, whereas over shorter periods no toxic effects were noticeable.

Symptoms of poisoning: The ante-mortem symptoms are those of drunkenness, staggering, and falling. In sheep there is depression and collapse on being handled. The animal's body is much distended after death. Post-mortem examination symptoms in sheep consist of haemorrhagic gall bladder and clots of blood in the heart.

Poisonous principle: The toxin which produces the staggering condition is not known, but an alkaloid occurs in the plant in small qauntities.

Ragwort. *Senecio jacobaea* **L. (Fig. 16, A and B)**

Botanical description: Habit—Annual to perennial herb with erect stems up to 3ft. tall, branching above and from the root stock. **Leaves**—Light green, the lower ones lyrato-pinnatifid with large terminal segments, the upper ones more dissected and irregularly toothed. **Flowers**—In heads about ½in. across, corymbosely arranged; ray

Fig. 14—*Rhododendron* spp. A: Habit. B: Flowers.

florets yellow. **Fruit**—A ribbed achene; pappus ¼in. long. (Eurasia and North Africa.)

Habitat: Pastures and waste places.

Distribution: Locally and very abundant in both islands.

General: Ragwort is known to have caused Winton disease in New Zealand since 1902 and is also known to be the cause of diseases of cattle and horses in Canada. Other *Senecio* species cause diseases in South Africa and the United States of America. In New Zealand the most common stock losses have been in cattle and horses. Sheep are known to be more resistant to ragwort poisoning than other farm animals, but poisonings in sheep are reported. Ragwort poisonings do not appear to be as frequent as in the earlier days of the investigation into Winton disease because of the control methods practised. When they have acquired a taste for ragwort sheep can be used to keep the plant controlled, but continued grazing produces the diseased condition. Ragwort poisoning in general is a chronic condition because of the cumulative effect of the toxic alkaloid present in the plant. The whole of the ragwort plant is toxic when fresh and dry, though there is the suggestion that toxicity increases up to flowering time.

Symptoms of poisoning: Antemortem symptoms in cattle are indefinite unthrift and loss in condition, diarrhoea, nervous disturbance, and irritability extending over a period of weeks; the milk is tainted. Horses show dullness, unsteadiness, aimless wandering, and slow, deliberate eating of food for a shorter period than in cattle; dark urine, and yellowness of visible mucous membranes are other symptoms. Cirrhosis of the liver is the most prominent of the post-mortem symptoms. The carcass may be yellow.

Poisonous principle: The alkaloid jacobine is the toxin.

Cape Ivy. *Senecio mikanioides* **Otto. (Fig. 16, C)**

Botanical description: Habit—Glabrous climber with flexuous stems up to 15ft. long. **Leaves**—Up to 3in. broad, palmately veined, 3 to 7 lobed, almost heart shaped at bases. **Flowers**—Heads in crowded panicles on slender pedicels, receptacle narrow, rays yellow. (South Africa.)

Habitat: Waste places and margins of damaged forest.

Distribution: Mostly in North Island; also about Nelson and Dunedin.

General: Cape ivy has caused only one known poisoning in New Zealand —when cattle were poisoned in Taranaki during 1946. A case of poisoning in New South Wales is also on record. Feeding trials with rats at the Animal Research Station, Wallaceville, indicate that Cape ivy is toxic, but not necessarily lethal, when it constitutes about 15 per cent. of the fodder. It appears that Cape ivy is a potential poisoning plant. The alkaloid mikanoidine is present in the plant in very small quantities.

Quick-fastening Insulator for Electric Fence

A QUICK-FASTENING and rapid-release insulator for use with electric fences which has been devised by Mr. C. Sargent, a farmer of Te Puna, Bay of Plenty, is shown below. It is strong and cheap and if made properly will enable the electric fence wire to be attached or detached from each standard in a few seconds.

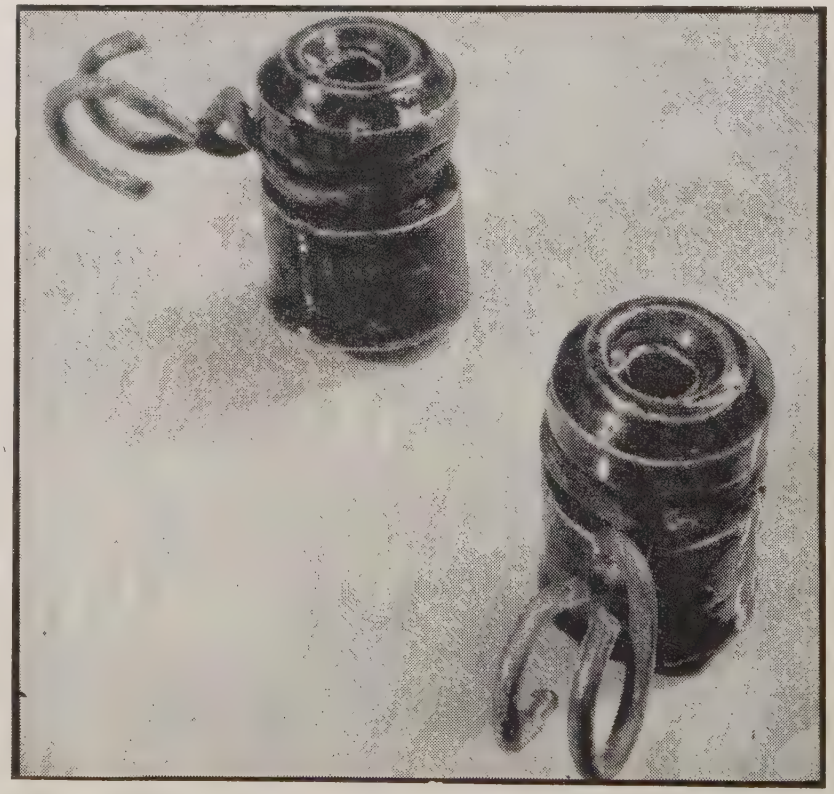
MATERIALS and equipment required are: Iron fencing standards, insulators, some wire (pliable), a vice, pliers, and a piece of round wood or iron about ½ to ¾in. diameter.

To attach this type of insulator proceed as follows: Place an iron fencing standard in a vice and attach the insulator in the usual manner. Take a short length of wire and bend it round the insulator (in the groove) in the form of an inverted U. (No. 8 gauge fencing wire is too hard and will probably break the insulators. Use any wire that is pliable and strong; No. 8 gauge copper wire is suitable.) Pull the ends of the wire loop across one another and twist them with pliers to get the wire tight round the insulator. Place a round piece of wood or iron (½ to ¾in. diameter) between the two ends of the wire loop and pull them round it. Cut off both ends of the wire just past the half-way mark. Prise open the two hook-like loops wide enough to take the fencing wire easily.

If no vice is available to hold the standard, a piece of ¼in. rod or a bolt can be stapled to a post and the wire loops on the insulators made there and the insulators fixed to the standards afterward.

To erect a fence using the insulator drive the standard into the ground with the insulator facing the **same way** as the wire is running, lift the wire and slip it between the hook-loops on the insulators, and turn the standard in the ground so that the insulator is at right angles to the wire. To dismantle the wire give the standard a half turn so that the insulator is parallel with the wire and lift the wire out.

It is important that the hook-loop should not be loose, because if it makes contact with the standard, the electric current will be short circuited.



Two views of the quick-fastening insulator. The upper view, which is a reflection in a mirror of the lower, shows the obverse view.

Distribution of Pampas Grass

By W. A. JACQUES, Massey Agricultural College.

PAMPAS grass (*Cortaderia selloana*) has been distributed by nurseries to farmers in large amounts over the greater part of the last two decades. Until now, no map has been issued showing its distribution, though it has been apparent that a very large proportion of it has gone into the dairying districts. A distribution map has now been prepared based on the sales of the two firms who have specialised in pampas grass production. These firms have extensive nurseries, a large turnover of plants, and have kept detailed records of sales.

WHILE the figures given below for the 4 years 1945-48 do not represent the whole of the pampas grass planted in those years, the amount only and not the distribution will be affected by the omission of plants from other sources.

The amount of pampas grass sent out to farms varies from year to year. In 1945 there were record sales of plants in some districts, with the peak being reached in 1946 in other districts. The immediate demand appears to have been satisfied in these 2 years, for during 1947 and 1948 much less was distributed.

The two firms on whose sales the distribution map is based distributed 2,426,360 plants, which represents over 80 per cent. of the estimated total of plants sold, during the 4-year period. Of these, 2,267,080 went to farms in the North Island and 159,280 to farms in the South Island. In addition it is estimated that a further 550,000 plants were purchased, mainly for planting in the North Island, bringing the total to 2,976,360.

With a 6ft. spacing, using approximately 1000 plants per acre, this would represent 2976 acres, but as wider spacing was being recommended by the venders in the latter part of the period, the acreage planted is likely to exceed this.

The distribution map shows how the pampas grass areas are distributed throughout the North Island. Each dot represents 1000 plants.

By far the greatest concentration is found in the Waikato, with coastal Taranaki, a strip inland from Mt. Egmont and the Manawatu, showing fairly high concentrations. Isolated areas of high concentration are found round Napier, Wairoa, Gisborne, and just north of Auckland City; elsewhere the stands are scattered.

Distribution of pampas grass in the North Island, 1945-48 inclusive. Each dot represents 1000 plants.

Soil Type

Pampas grass is found growing on a wide variety of soil types. Distribution does not appear to be determined primarily by soil types, but rather by other factors. Even so, some soil characteristics do lead to a greater use of pampas grass in certain areas. For best results pampas grass needs a deep soil with good drainage. Such soils are found in the weakly and moderately leached yellow-brown loams in Taranaki, where yields of 50 tons of green fodder per acre can be grown. This fodder is a particularly useful standby for both summer and winter and an insurance against too great a loss of feed through pasture destruction by grass-grub or shortage of feed due to drought.

In the Waikato there are numerous soil types on which pampas grass is grown. It is found principally on the drained and shallow peats and on the brown loams. In the Manawatu it is found on the yellow-grey earths and yellow-brown sands and on the organic, alluvial, and volcanic soils round Wairoa, Hastings, and Tauranga.

Other Factors Affecting Distribution

Until recently pampas grass was recommended for use solely on dairy farms as a supplement to grass. The lowlands of the Waikato, Taranaki, and the Manawatu are recognised as the principal dairying districts. The amount planted in North Auckland has been small, but this may alter with further land development. The milder winters experienced there, however, may reduce the necessity for it, particularly where improved and high-yielding pasture is being produced. Pampas grass grows well in the North Auckland peninsula provided it is given the requisite attention, so that should there be a demand for it there, it would constitute a heavy-yielding crop, particularly on the better-drained areas.

By 1948 only a relatively few areas had been planted in the higher sheep-grazing country. It is becoming clear, however, that there is more interest being taken in pampas grass for the purpose of helping to winter run cattle, which is a logical use. The nutritional demands are not so great for the run cattle as they are for dairy cows. In addition it is possible to use pampas grass for grazing sheep and as a source of clover seed which can be distributed through the stock on to poorer pastures. Clovers—white or subterranean—can readily be established with cultivation and the use of phosphate fertiliser between the rows of pampas grass. If kept grazed by sheep until flowering time and then allowed to develop seed, the pampas grass can be grazed in such a way as to allow for the greatest diffusion of the dung from the grazing stock on to a run-off area. Dung and seeds are deposited together on the pasture and this constitutes the most effective means of establishment of clovers on poor hill country. The seed takes from 1 to 5 days to pass through the sheep (1). Unfortunately pampas is slow to develop at higher elevations and particularly so where cultivation during the first year of establishment is neglected. Even so, it is likely that there will be a reduced demand from dairy farms and an increased demand on hill-country sheep farms for wintering cattle and as a cheap and simple means of hill-country improvement.

1. Suckling, F. E. T.: "The Passage of White Clover Seeds through the Body of Sheep and the Effect on Germinating Capacity" (Proceedings of the Grassland Association, 1950).

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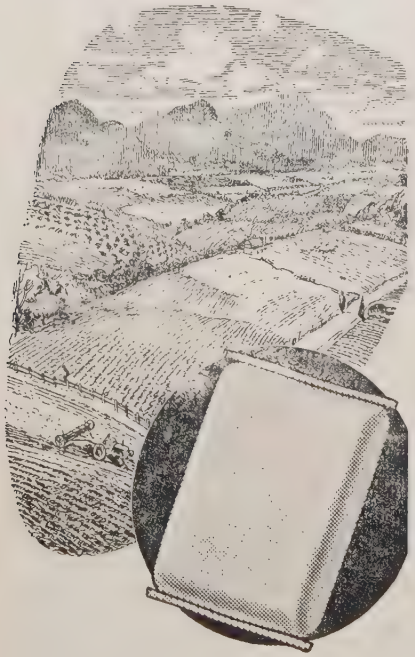

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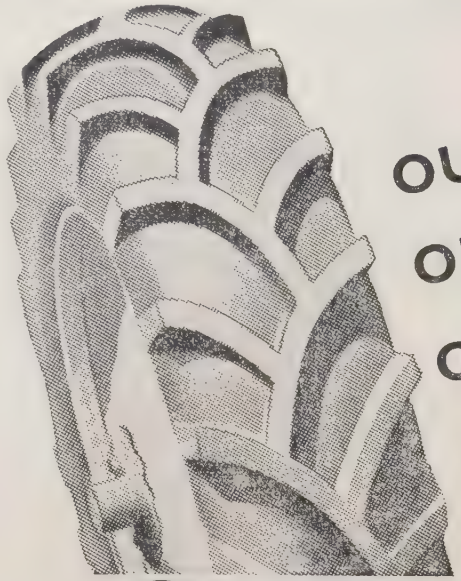

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Pasture Management and Crop Production

SEASONAL NOTES Contributed by the EXTENSION DIVISION

AUTUMN work covers not only seasonal operations for autumn- and winter-sown crops, but also preparations for winter feeding. Autumn topdressing, the closing of pastures to be held for winter and spring feeding, and the commencement of supplementary feeding before grass growth stops are all practices which help to raise winter carrying capacity and production.

* * *

PHOSPHATIC FERTILISERS

Phosphatic fertilisers for topdressing will be limited this year in the North Island to serpentine superphosphate, a superphosphate - serpentine - Nauru mixture, North African phosphate, and basic slag; in the South Island a lime-reverted superphosphate will be available in addition to those mentioned. Serpentine superphosphate will give as quick and efficient results as superphosphate, and the superphosphate-serpentine-Nauru mixture should be equally efficient. On lime-deficient soils where liming is not practicable (such as many hill-country soils in high-rainfall districts) North African phosphate and basic slag will give excellent results. To raise winter carrying capacity phosphatic topdressing fertilisers should be applied in early autumn.

NORTH AFRICAN PHOSPHATE

North African phosphate is a very useful fertiliser for topdressing in all the higher-rainfall areas. The material is not chemically treated but finely ground and trials have shown that the commercial product is sufficiently finely ground for satisfactory results. Both North African and Nauru phosphates have considerable residual effects.

* * *

SAVING PASTURES FOR SPRING FEEDING

THE season's production from a dairy herd is influenced to a great extent by the feed it gets, particularly during the first 6 weeks after calving. If a satisfactory and adequate milk-producing ration is to be available at the beginning of next milking season, the dairy farmer must act now by carefully considering which fields and what total area he must shut up for late-winter and early-spring feed. The fields selected should be good ryegrass pastures and if possible should be different fields from those used for the same purpose last year. This will avoid overdoing the suppression of white clover and the opening up of the sward. In general the area closed should be from a third to half of the farm, and fields should be closed in succession from early May to the middle of June.

EARLY FEEDING OUT

To enable fields to be closed for winter and spring feeding, autumn supplementary feeding must start before grass growth ceases. Fields should be closed while the grass is still growing. Silage will normally be the main supplementary feed in autumn while the herd is still milking and each cow will require about 20lb. of silage per day in addition to any grass which is available. From the middle of June to the middle of August pasture growth is usually at a standstill and most of the herd dry; supplementary feeding for this period should consist of about 20lb. of silage and 12lb. of hay per cow per day. While wintering the herd on this supplementary fodder it should be confined to a few fields and those selected should be low in clover content or those where Yorkshire fog has invaded the sward and where heavy supplementary feeding will be valuable in rejuvenating the pasture.

CUTTING AND SPRAYING RUSHES

THERE is some evidence that the most common species of rush (*Juncus polyanthemos*) of pasture lands may be controlled with hormone weedkilling sprays. The rushes are mown in early winter several months before the application of the hormone weedkiller. The young shoots are then treated in October to December with 1 to 2lb. of acid equivalent per acre of an oil-based ester of 2, 4-D.

The annual toad rush (*J. bufonius*) and the rushes with soft grass-like leaves (*J. tenuis* and *J. planifolius*) are also moderately susceptible to the oil-based ester of 2, 4-D in the seedling stages. Other species of rushes, namely, *J. pallidus* and *J. vaginatus*, appear more resistant, especially when growing on poor soils. Because of the variation in susceptibility of rush species to hormone weedkillers, farmers should have the species of rushes identified through the local Instructor in Agriculture before hormone weedkillers are used.

* * *

MOLE DRAIN OUTLETS

WHERE mole drains have been pulled with individual outlets into a ditch or the side of a gully, regular inspections should be made and attention given where necessary. An outlet that is partially or completely blocked will quickly cause a breakdown of the channel so that new mole drains will be necessary in the area. Mole drain outlets can be protected by pulling a small-diameter tile into the outlet, which can be done with a special attachment fitted to the mole plough.

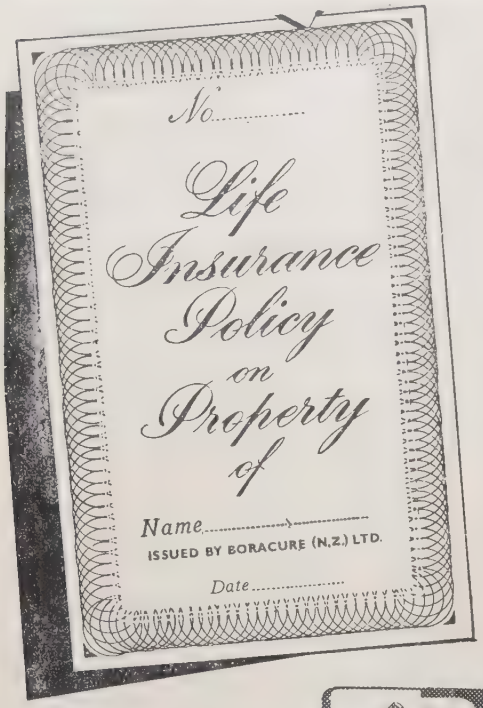
* * *

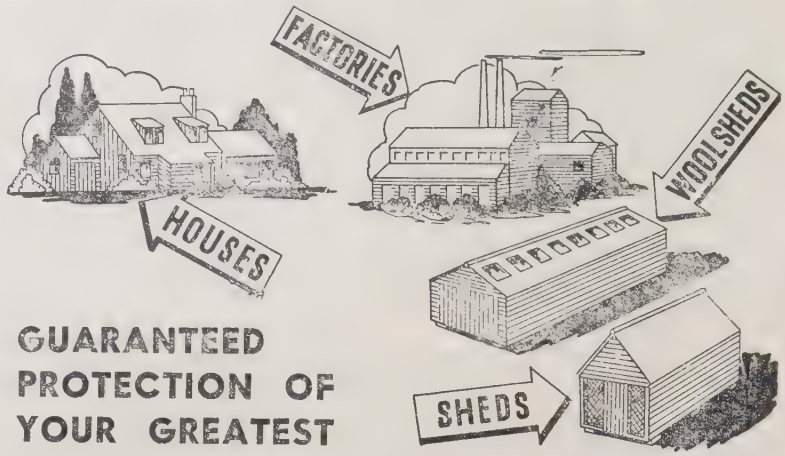
POTATO HARVEST

EACH year thousands of tons of potentially good potatoes have to be turned into pig feed or degraded owing to damage and subsequent dry rot infection that prevents their passing as f.a.q. lines. Most of the damage responsible for these losses arises from careless handling during digging and pitting operations or to a smaller degree while grading. During September, 1950, two shipments of potatoes left Timaru for Sydney, the first consisting of 44,373 sacks and the second of 27,613 sacks, and the consignments were reported on in Sydney as being sound and of good general commercial quality. This satisfactory condition was due to careful supervision before shipment, which prevented the inclusion of unsatisfactory lines. In the first shipment 12 per cent. of the quantity forwarded and in the second 6 per cent. were rejected on the wharf in spite of preliminary selection on the farms of lines considered suitable for shipment. The rejection of nearly 10 per cent. of the potatoes in these consignments resulted mainly from damage during digging.

CAUSES AND PREVENTION OF DAMAGE

Digger damage is perhaps the most frequent cause of deteriorated lines of potatoes. The digger must be worked at sufficient depth to avoid slicing the tubers, a most obvious precaution that is sometimes overlooked. If, when digging, soil conditions are very dry and little earth passes over the elevator, use plain rollers on the front chain and remove the back apron. This avoids unnecessary bumping and bruising. Do not attempt to lift the main crop before it is properly matured, otherwise a large proportion of tender-skinned tubers become badly peeled, affording greater opportunity for the onset of severe dry rot infection. If the digger is kept at a slow speed, the result is less agitation of tubers on elevators and aprons and consequently less likelihood of undue damage. Where potato moth damage is evident do not cover bagged tubers with infected haulms. Grade out infected tubers when bagging the potatoes and remove them from the field immediately after digging.





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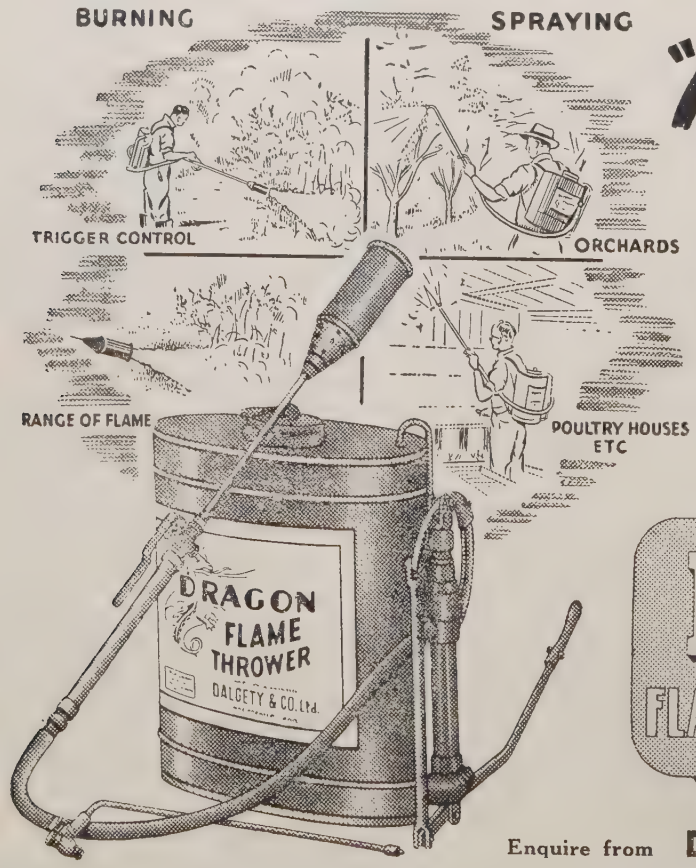

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Cleaning of Single-unit Bucket Milking Plant

MUCH has been written on the most satisfactory and efficient method of cleaning standard or releaser-type milking machines, but owing to the increasing popularity of single-unit bucket milkers in small dairies and to the fact that the procedure recommended for the thorough cleansing of the releaser plant cannot be applied fully to the bucket milker, it is important that operators should be conversant with the best methods of cleaning single-unit bucket milking plants. Cleaning procedure is discussed in this article by L. W. Scott, Farm Dairy Instructor, Department of Agriculture, Hastings.

A 1-cow bucket milking machine installed in the bail dummy.

THE set-up of the machines is not the same in every dairy, but in the most common installation the vacuum pump and electric motor are mounted in the bail dummy and milking is carried out in a pair of bails having either one or two sets of teat-cups. There is another arrangement where the vacuum pump and electric motor are mounted in the dummy of one pair of bails and the air system is extended overhead by metal tubing to a second pair, thus converting the single unit to a 2-cow bucket milker. With the latter set-up more time and care are needed to keep the air system clean. It will be appreciated that the glass vacuum jar attached to a mounting on the vacuum pump is too small to allow sufficient liquid to be discharged into it without possible injury to the pump, and apart from this there is the risk of the boiling cleansing solution breaking the jar.

Vacuum Jar

The glass vacuum jar performs a dual purpose on the single-unit bucket type of milking machine in that it acts as a moisture trap to prevent vapour from being carried to the pump and it serves as a detector. As a detector it is most important, because there is always the possibility that the vacuum milking bucket will be allowed to become too full of milk, in which case the milk will be drawn up the vacuum rubber toward the pump, but because it has first to enter the glass jar, the operator is able to see immediately what is taking place.

The importance of keeping the whole air system thoroughly clean cannot be stressed too strongly. First, the milk vapour from the warm milk is continually being drawn up the vacuum rubber attached to the lid of the milk bucket during the whole milking process, and if this milk vapour is allowed to remain in the rubber, it soon becomes stale and sour and can become a direct source of contamination to milk in the bucket immediately the vacuum on the machine is broken. Secondly, the pulsation rubber from the teat-cup claw to the pulsator can become contaminated through milk being admitted from a burst inflation or from moisture drawn in through a cracked claw rubber or a damaged teat-cup mouth. It must be appreciated that there is a direct connection from both the pulsation rubber and the vacuum rubber, through the vacuum jar, and back to the milk bucket, and when the machine is under vacuum foul air can be discharged into the bucket immediately the motor is switched off.

Methods of Cleaning

The cleaning of the teat-cups and milk rubbers should be carried out in the same manner as that recommended for large machines, that is:—

1. Wash the outsides of the teat-cups and rubbers in a warm caustic soda solution in order to remove any traces of manure, milk splash, and teat salve.
2. Draw at least 1 gallon of clean or lukewarm water through each set of teat-cups to remove all traces of milk from inside the rubbers and milk bucket.
3. Draw 1 gallon of **boiling** caustic soda solution, at the strength of 1 teaspoon of caustic soda to 4 gallons of water, through **each** set of cups, and follow this immediately with at least 1 gallon of clean **boiling rinse water** through each set of cups. (Where more than one set of teat-cups is used it is not sufficient to draw a gallon of boiling solution through one set and then to draw the same solution through the next set because after contact with the first set of cups and the milk bucket, the solution will have lost its cleaning efficiency owing to the considerable reduction in temperature. If the rinse water is drawn into the bucket containing the caustic solution, the diluted solution can then be safely used for the final washing up of the milk buckets, odd rubbers, separator, and other equipment.)
4. Disconnect all rubbers, both air and milk, from the bucket lid, and the pulsation and vacuum rubbers from their fittings on the vacuum pump. Also, at this stage remove the glass vacuum jar and its rubber ring from the mounting on the pump, taking care to remove with a clean cloth any surplus oil and milk vapour which may have collected on the under side of this mounting. If the lid of the bucket is fitted with a glass sight or detector jar, this must also be removed, together with its rubber joint ring, for washing. Remove too the large rubber ring around the rim of the lid, as milk will get behind this rubber and unless it is removed and washed the milk acid and moisture will soon set up rust and become another source of contamination.
5. The teat-cups, claw rubbers, and long milk rubber will not need any further cleaning and these should be hung up in a cool airy place away from direct sunlight. All the disconnected rubbers, glass jars, bucket lids, and buckets must be hand brushed in the diluted caustic solution and after a thorough rinsing in clean boiling water be laid out on a clean bench where they will get the maximum of fresh air. Metal parts are best kept out in the open air and in sunlight. (A long-handled tube brush can be procured for the long air tubes, but it must be used as lightly as possible or excessive scoring of the smooth inner surfaces of the tubes will take place. A brush should not be used on milk rubbers.)

Two-cow Bucket Milker

The cleaning of the air system of the 2-cow bucket milker does not present any great difficulty. By using one of the vacuum milking buckets as a vacuum tank both the pulsation and the vacuum sides of the air system can be flushed with boiling caustic solution and rinsed with clean boiling water completely and satisfactorily.

Remove the vacuum rubber leading to the second bail from its fitting at the vacuum pump, connect this rubber to the milk inlet on the lid of the bucket to be used as a vacuum tank, connect up the vacuum side of the lid to the pump in the usual way, remove the vacuum rubber from the bucket lid in the second bail, and place the end of this rubber in the caustic solution. When the plant is started up and a vacuum is produced in the vacuum bucket the cleansing solution will be drawn from the container through the system to the bucket. By changing over the vacuum rubber to the pulsation rubber fitting at the pulsator and by connecting the latter rubber to the lid of the bucket, the pulsation system can be cleaned in the same manner.

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Gable-roofed Glasshouse for Home Gardeners

By I. L. NOTTAGE, Horticultural Superintendent, Department of Agriculture, Auckland.

A GREAT deal of thought and ingenuity has been devoted to development of large glasshouses suitable for indoor production of tomatoes, grapes, and other crops on a commercial scale. The ever-increasing demand for out-of-season crops has justified extensive research into both culture and housing, with special attention to requirements over a considerable climatic range. Designs for large glasshouses with floor areas of 3000 to 6000 square feet and even larger have been the chief preoccupation of those interested in commercial production, but there are also many domestic gardeners keenly interested in growing plants under glass. This article describes the construction of a small gabled glasshouse to meet the requirements of those who cannot take advantage of an existing building to construct a simpler and less costly lean-to house.

THE objective has been simplicity of design with provision of adequate lighting and effective ventilation. A fully glazed house is described, but it could be modified without difficulty to meet special uses. For instance, if the south end is unprotected from cold winds, it could be of wood instead of glass. If benches are to be used for propagation work, the side walls need be only 4ft. 6in. to 5ft. high; they could be of wood or concrete up to bench height and the side ventilators could be lower than the benches instead of high up on the walls as illustrated.

Outside measurements of the glasshouse are 13ft. x 9ft. 10in. (inside they are 8in. less each way), but these measurements suit glass 18in. wide and would have to be modified if glass of a different size were used. The side walls are 6ft. to the tops of the studs and the ridge is 9ft. 6in. high.

In calculating spacings for studs and rafters which are to carry glass amateur builders should make the following allowances: Width of glass, plus width of strip between rabbets, plus $\frac{1}{8}$in. extra for fitting the glass.

For example, using 18in.-wide glass and 3in. x 2in. timber, spacings would be:—

	in.
Glass	18
Strip between rabbets after timber has been dressed and $\frac{3}{8}$in. rabbets made each side (for glass)	$\frac{7}{8}$
Allowance for fitting	$\frac{1}{8}$
Total spacing (centre to centre)	19

The strip between rabbets on the rafters should be checked, as it varies appreciably in width, according to the dressed measurements of the timber.

Special allowances must be made for corner posts and for heavier timbers which may be used for door posts, etc.

Construction

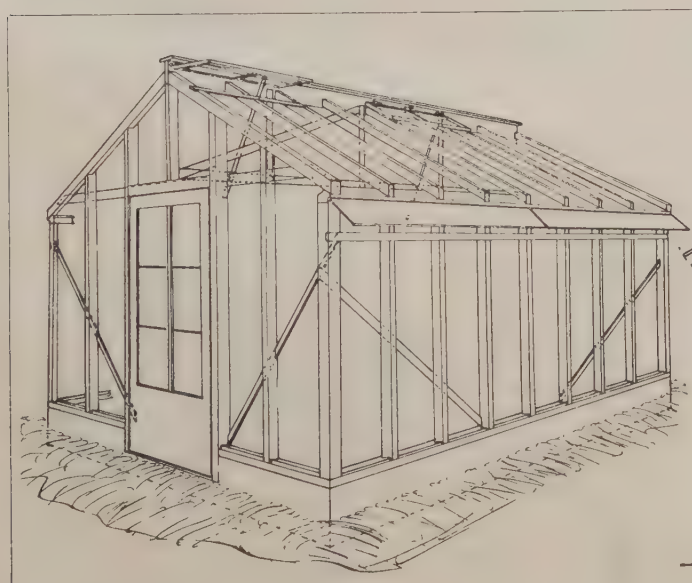
Undressed timber measurements are quoted in all instances, and some allowances must be made for dressing. The general appearance of the house is shown in Fig. 1.

The foundation is of concrete and need not be reinforced for a house of these dimensions. The concrete is 4in. wide at the top and 6in. wide at the base, and projects 7in. above ground level, but the latter measurement may be a few inches higher if glass is less than 18in. deep. The foundation should go down to solid clay, usually 6in. to 9in. If the soil is not very firm, a wider base should be used.

At intervals of approximately 3ft., galvanised bolts 8in. x $\frac{3}{8}$in. should be set, projecting $3\frac{1}{2}$in. above the concrete, for attachment of the bottom plate.

The bottom plate should be of 4in. x 3in. timber cut as shown in Fig. 4, with the top surface sloping inward, away from the glass.

Side studs are of 3in. x 2in. timber, except those at the corners, which are 3in. x 3in.; all studs are cut as shown in Fig. 4. Door posts are of 4in. x 2in. timber. All wall studs are set as shown in Fig. 3. Braces of 3in. x 1in. timber are used as illustrated in Fig. 1.



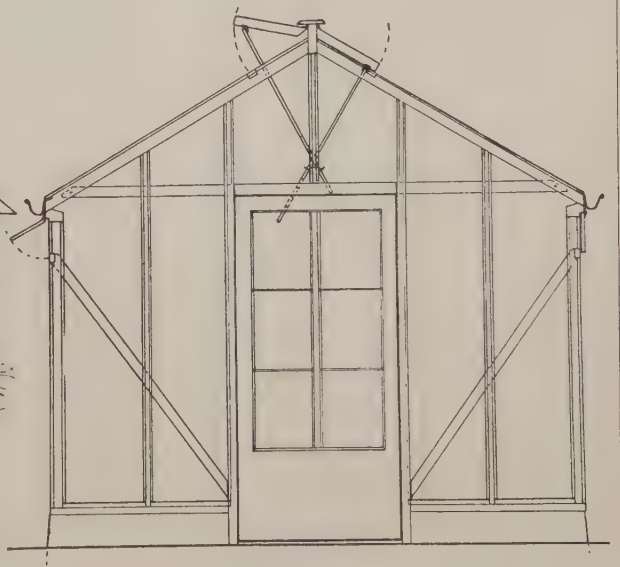


Fig. 1 (left)—General view of the small glasshouse, which is 13ft. x 9ft. 10in. (outside measurements). Fig. 2 (right)—Front elevation, showing door and sectional details of ventilators.

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The lower ends of the studs must be cut to fit the slope of the bottom plate.

The top plate of the side wall is of 4in. x 3in. timber cut as shown in Fig. 4 and fitted as in Fig. 2 with a 1in. x 1in. rabbet on the lower outside edge to take the ventilator shutter.

Rafters 5ft. 6in. long, which give a pitch of approximately 30 degrees to the roof, are fitted with their lower ends flush with the outer edge of the wall top plate (Fig. 2). End rafters are 3in. x 3in. and others 3in. x 2in. to match the wall studs.

The ridge plate is 6in. x 1½in. as shown in Fig. 4, and is surmounted by a 6in. x 1in. cap illustrated in Fig. 2. The lower edges of the cap should be grooved to shed rain-water.

Three cross-ties of 4in. x 1in. timber are used as in Fig. 2 with their lower edges 6ft. 6in. above floor level. There is one at each end and one at the centre of the house, those at the ends being attached to the end studs as well as to the rafters to which they are bolted at each end.

A 3in. x 2in. board runs the full length of the house, resting on the centres of the cross-ties and supported at three points by 3in. x 1in. boards from the ridge plate (Fig. 1). In the same illustration are shown 2 angle braces of 3in. x 1in. timber which run from the centres of the end cross-ties to meet at the centre of the ridge plate.

Ventilators

There are 4 double-pane roof ventilator sashes arranged alternately each side of the ridge (Figs. 1 and 2). The sashes are 12in. deep, hinged to the ridge plate, and operated by hinged 2in. x 1in. boards (Fig. 2). Series of holes at 2in. intervals are drilled in the lower ends of these boards. They fit over nails driven into the central board above the cross-ties, and the ventilator openings are adjusted by using different holes.

Side ventilators are at the tops of the walls, the most suitable place on a glasshouse used for tomato production or for general purposes, because in that position they are effective without causing draughts. For a seedling house it would be better to have side ventilators below the level of the benches.

The ventilator openings are 7in. deep and a 2in. x 1in. board is rabbeted into the studs at their lower edges. The ventilators are of the flap type, 9in. boards hinged as shown in Figs. 1 and 2 and adjusted by means of window brackets. They should be in 2 sections each 6ft. 6in. long.

Spouting is designed as illustrated in Fig. 2, the inner edge being slipped into saw cuts (beneath the glass) in the ends of the rafters. Nails driven through from above hold the spouting in position. The spouting serves to fill the space between wall top plates and the roof glass.

If 18in. x 18in. glass is used 3 rows are needed on the side walls and the same number on each side of the roof.

The door is 6ft. 6in. x 3ft. and should open outward; there is no objection to having a door at each end, but usually that is unnecessary.

Galvanised or Copper Bolts and Nails

All bolts should be galvanised and nails either galvanised or of copper as

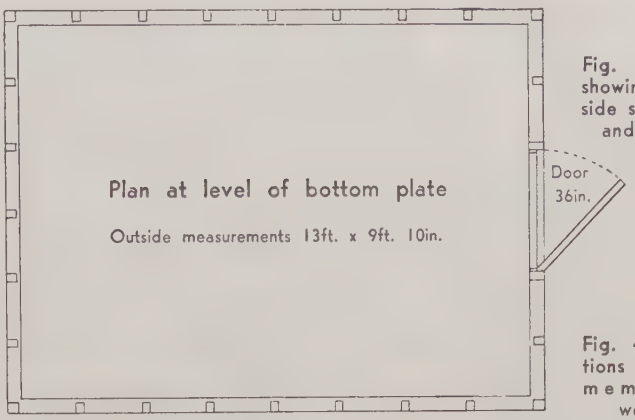
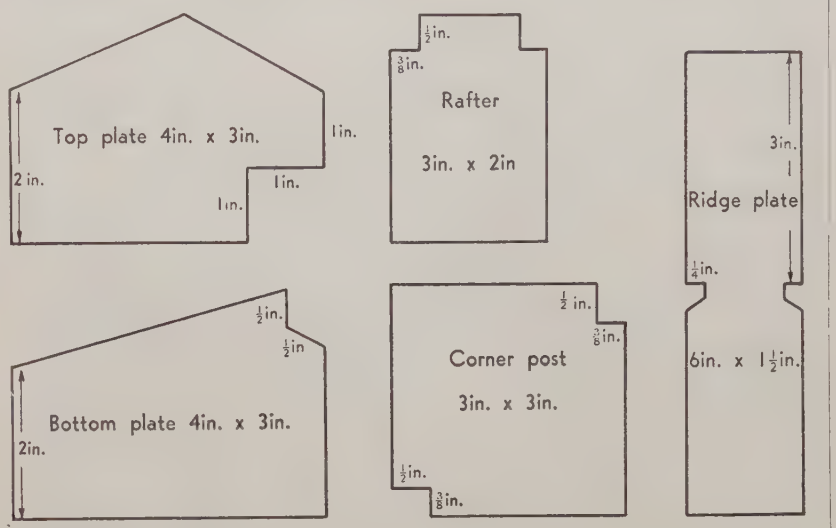


Fig. 3 (left)—Plan showing positions of side studs, door posts, and corner posts.

Fig. 4 (below)—Sections of specially cut members of the wooden frame.



Materials Required for Glasshouse

	Dimensions in.	Total
Timber		
Bottom plates (totara)	4 x 3	45ft.
Side studs (oregon)	3 x 2	14 pieces 5ft. 3in.
Corner posts (oregon)	3 x 3	4 pieces 5ft. 3in.
End studs (oregon)	3 x 2	8 pieces 7ft. 6in. to 8ft. 6in.; 1 piece 9ft. long
Door posts (oregon)	4 x 2	2 pieces 8ft. 6in.
Top plates (rimu)	4 x 3	30ft.
Rafters (oregon)	3 x 2	14 pieces 6ft.
End rafters (oregon)	3 x 3	4 pieces 6ft.
Ridge plate (rimu)	6 x 1½	13ft.
Ridge plate cap (rimu)	6 x 1	13ft.
Cross-ties (rimu)	4 x 1	3 pieces 9ft. 6in.
Centre runner (rimu)	3 x 2	13ft.
Bracing (rimu)	3 x 1	100ft.
	2 x 1	60ft.
Side vents. (rimu)	9 x 1	26ft.
Door	3ft. x 6ft. 6in.	
Roof vent. sashes (double panes)		4
Other Materials		
Spouting (galvanised)		26ft. of 5in.
Glass (20oz. or 22oz.)		200 sheets (approx.) 18in. x 18in.
Paint		1 gallon priming; 1 gallon white finishing
Putty		6lb.
Nails (galvanised or copper)		4lb. (approx.) of 2in., 2½in., and 3in.
Brass brads (small heads)		½lb.
Brackets for side vents		4
Door lock		1
Hinges for roof vents. and door		
Bolts for bottom plates		14, 8in. x ⅜in.
Cement, sand, and shingle for foundations according to depth of foundations		

plain iron nails or screws very quickly rust through in the humid atmosphere of a glasshouse.

Glass should not be overlapped more than ¼in.; it should be set in a bed of putty and held in place by brass brads.

Totara is best for bottom plates and oregon for the rafters and studs which carry glass, but well-seasoned heart rimu is suitable elsewhere. Glasshouses made of inferior timbers usually give trouble. A moisture course must be used between concrete foundation and bottom plate.

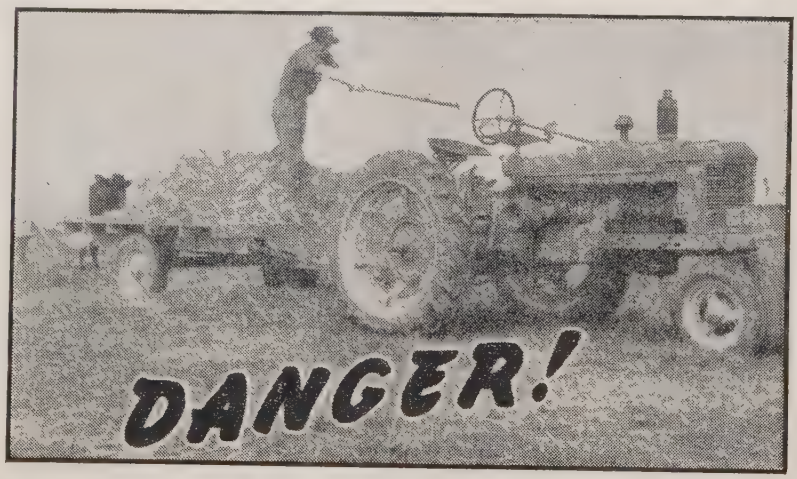
All timber should be given a coat of primer before the house is built, a coat of paint before glazing is done, and a final coat when construction is finished. The final coat, which helps to waterproof the house, should always be of white paint. The outside of the house should be repainted each year, and the inside every second year.

Materials Required

The measurements and quantities shown are for a house constructed with 20 or 22oz. 18in. x 18in. glass. If glass of other dimensions is to be used, the plans must be altered to some extent and the measurements of timber will be slightly different.

Cost

No attempt has been made to show details of the cost of a glasshouse of this type, because costs have not been stable for a number of years. Larger commercial glasshouses cost approximately 7s. a square foot, but a smaller house may cost about 50 per cent. more than that figure. Considerable savings can be made if gardeners are able to build their own glasshouses.



DURING winter much food must be fed out on dairy farms to keep the stock in condition. A large proportion of this work is done with the aid of machinery, sometimes on steep to very steep country, and in these conditions it entails quite an element of risk. The risk becomes much worse when the work is done single handed, as it frequently is in many parts of the country.

To avoid the risk involved in steering a tractor with a fork, as in this illustration, some arrangement should be made to lock the wheel on a straight course, or the feeding out should be done only when the tractor is stationary.

A man who is to feed out a high load of hay from a trailer should climb up from the back, using a rope secured to the front of the trailer and flung over to the rear, and should also jump or slide down at the rear rather than at the front or side, when a fall may result in his being crushed by the trailer wheels.

Hay forks should be left well clear of stacks or trailers to prevent workers landing on them. A hay knife should be put back into the stack after use to prevent injury to animals or humans. The force of a drop should be broken by placing a fork to the right or left, never right in the line of descent.

Rain and frost make grass slopes dangerous when brakes are applied too hard. The tractor wheels will stop turning, resulting in a skid in which control is lost and which can cause an overturned trailer or tractor or both.

If two men are engaged in feeding out, the driver should be careful in engaging the clutch. The person on the trailer may be flung off the load or even off an unloaded trailer if the clutch is engaged savagely.

—J. N. WHYTE, Farm Machinery Instructor,
Department of Agriculture, Dunedin.

Agricultural and Horticultural Courses with the Technical Correspondence School

FOR students and would-be students who cannot attend classes at a technical college because of such reasons as distance, hours of work, or ill health, and for members and ex-members of the armed forces, the Technical Correspondence School of the Education Department offers a wide range of courses. As well as covering a large number of trades and technical professions, the courses include subjects directly or indirectly concerned with agriculture and horticulture.

The agricultural courses have been prepared primarily for adults engaged in or training for farm work; they are not for students of secondary school age. The principal subjects are dairy farming (two sections) and the grasslands of New Zealand, and short courses are available in arable farming in New Zealand, principles of animal production, principles and practice of animal nutrition, crops and cropping, wool, and milk.

A 2-year course for the Dairy Factory Managers' Registration Board's examination consists of three subjects—buttermaking, cheesemaking, and dairy factory management.

Courses in horticulture and related subjects include surveying, levelling, and drainage (a short course), principles of botanical classification, commercial gardening, practical horticulture, fruit growing, an introduction to forestry, and an introductory course in biology. Those in surveying, levelling, and drainage and in principles of botanical classification are for the intermediate examination of the Royal New Zealand Institute of Horticulture, and it is hoped that courses in other examination subjects will be ready early this year. The commercial course is for workers in the market gardening industry. The others of this group are short elementary courses.

Applications for enrolment must be approved by the Education Department, and servicemen or ex-servicemen must be recommended by an Education Officer or Rehabilitation Officer. Further information may be obtained from the Principal, Technical Correspondence School, 29 Wallace Street, Wellington, S.1.

Radio Broadcasts

A RADIO talk will be given to farmers from Station 1YZ Rotorua at 7.15 p.m. as follows:—

May 10—"Pasture Management in Winter", by G. A. Blake, Instructor in Agriculture, Department of Agriculture, Matamata.

The following talk will be given to farmers from Station 3YA Christchurch at 7.15 p.m.:—

May 21—"Farm Poultry Flock Improvements", by C. J. Goldsmith, Poultry Instructor, Department of Agriculture, Christchurch.

May 24—"Fruit Tree Planting and Pruning", by M. G. Baumgart, Orchard Instructor, Department of Agriculture, Christchurch.

Broadcasts will be given to farmers from Station 4YA Dunedin at 7.30 p.m. as follows:—

May 5—"Seasonal Work in the Garden", by A. G. Kennelly, Vegetable Instructor, Department of Agriculture, Dunedin.

May 23—"Young Farmers' Club Activities", by A. MacKenzie, chairman, Otago and Southland Council, Federation of Young Farmers' Clubs.

Other talks are given from 1YA Auckland on Tuesdays at 12.35 p.m., 2YZ Napier on Tuesdays at 7.10 p.m., 2YA Wellington on Thursdays at 12.35 p.m., 3YA Christchurch on Mondays at 12.20 p.m., and 4YA Dunedin on Thursdays at 12.35 p.m.

Pig Broadcast

Under the auspices of the Bay of Plenty District Pig Council a broadcast will be delivered in May as follows:—

Rotorua—1YZ, on May 24, "Food Values for Winter Feeding", by A. F. Barwell, Supervisor, Bay of Plenty District Pig Council.

Diseases Transmitted from Animals to Man

By I. G. WATT, Veterinarian, Department of Agriculture, Auckland.

THOUGH at present New Zealand has few serious animal diseases which can be communicated to man, closer contact with other countries, particularly through the great expansion of air transport, has increased the danger of introduction of such diseases. In the first part of this article, which appeared last month, some of the transmissible diseases which occur in New Zealand were discussed. Others, and diseases at present not found in New Zealand, are dealt with in this concluding portion of the article.

THE two fungous diseases ringworm and actinomycosis can be transmitted to man.

Ringworm: This skin disease is not caused by a worm but by several types of fungi. There are differences in appearance between the lesions produced by the different types, but for the purpose of this article ringworms which are transmitted from cats (most important), dogs, cattle, or horses, are dealt with as a group. Bare patches of skin appearing in furred animals, especially with scaly skin showing, should be promptly treated with tincture of iodine or with 10 per cent. salicylic acid ointment. Hands should be washed after handling infected animals of all species, as ringworm is extremely infectious and can be a distressing complaint.

Actinomycosis: Cattle are usually the victims of actinomycosis (lumpy jaw) and actinobacillosis (wooden tongue). Occasional cases do occur in man, however, which is not surprising, as the organisms causing the two complaints are widely scattered in nature. Actinobacillosis in animals frequently responds to potassium iodide drenches or sodium iodide injections, but actinomycosis often attacks the bone-forming sinuses or infected cavities, where it is very hard to treat. In man as in animals the disease gains access to the tissues round a decayed tooth root or through an injury to the gum.

For that reason it is extremely unwise to chew straws which may prick the mouth and are very likely to be infected with actinomycosis.

Whereas in cattle actinomycosis attacks the bone, in humans it usually involves the tissues surrounding the bone. Penicillin is effective, but treatment is slow.

Food Poisoning

Probably most cases of food poisoning found in New Zealand are due to the *Salmonella* type of organism. The organisms of this group are numerous and are closely related. Normally many of them are comparatively harmless inhabitants of the intestines of farm animals.

To stop further epidemics of psittacosis ("parrot fever") almost all countries have placed an embargo on the export of parrots of all types, but extreme care must be taken to see that the disease is not imported into New Zealand with finches and other birds.

Ptomaine poisoning was supposed to be due to the eating of decomposing and putrid food, but it is doubtful if putrid food in the absence of specific germs will cause food poisoning. For example, "high" game is eaten with relish and few ill effects by gourmets. Food poisoning discussed here does not include all cases of accidentally introduced poisonous substances such as arsenic, lead, etc., or the allergic responses to various foods; nor does it include communicable diseases such as scarlet fever, diphtheria, typhoid fever, and dysentery, which may be all spread from human carrier cases by raw foods such as unpasteurised milk.

Food infection, in the technical sense, is confined to certain infections associated with specific bacteria. There are three main types. Staphylococcal infection, which is quite frequent, is produced by staphylococci, the commonest of pathogenic organisms on the skin, where some can cause boils. The poison here is developed in the food by the organism, and the symptoms of nausea, vomiting, etc., are felt in an hour or so and are often as rapidly over. *Salmonella* poisoning is caused, however, when the living organisms gain access to the bowel with infected food and there develop toxins. They produce the usual nausea, severe vomiting, and diarrhoea, and can be fatal if sufficient quantities are eaten.

The *Salmonella* group are found frequently in the intestines of animals; infected meat products and food contaminated by rodent droppings are common causes of outbreaks of the complaint in humans. Fortunately in this country obviously sick animals

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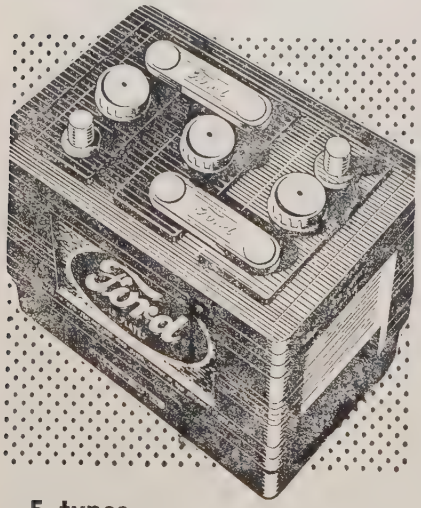

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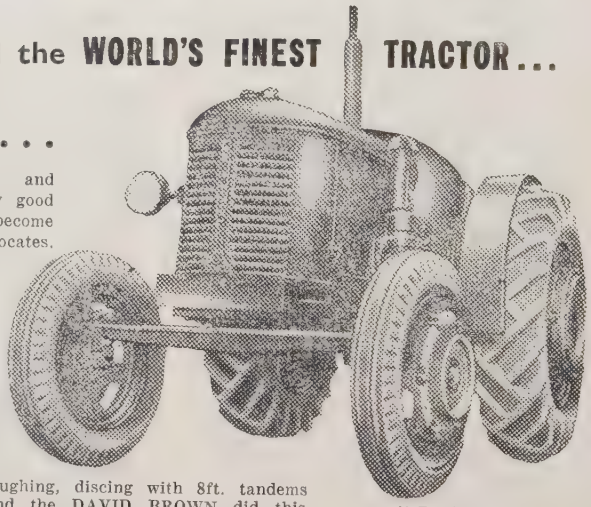

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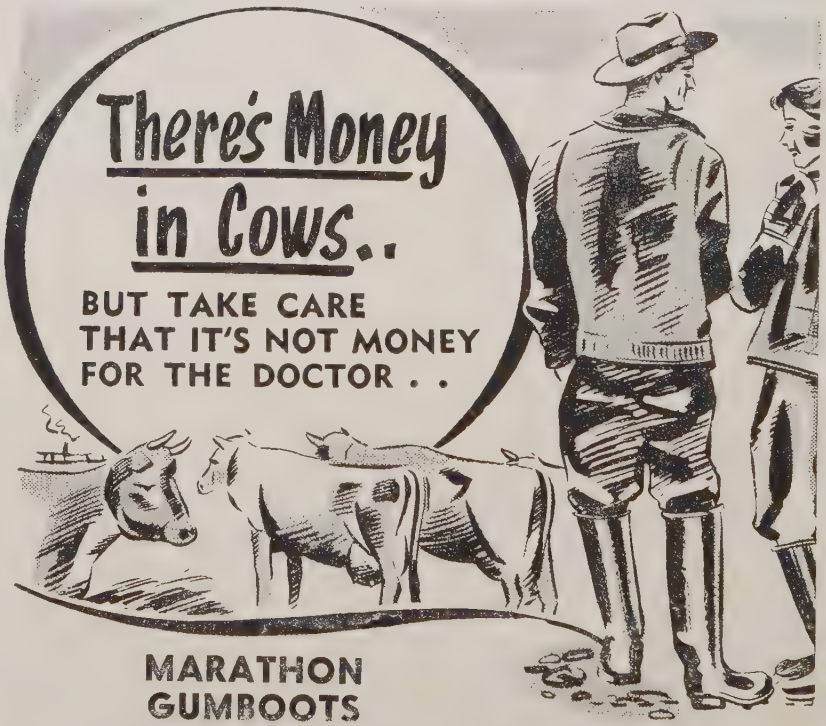

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are not slaughtered for food and epidemics of *Salmonella* poisoning are thus largely avoided. The organisms can multiply in most foods without showing many obvious signs of their presence.

Thorough cooking will kill all *Salmonella* organisms.

Poisoning from Dried-egg Powder

In Great Britain the use of spray-dried eggs caused an increase in the number of food poisoning outbreaks. However, although hens are attacked by *Salmonella* species, the actual *Salmonella* organisms responsible for food poisoning are seldom if ever found in the ovaries. Thus the source of contamination in dried-egg powder was somewhere in the process of manufacture and in subsequent handling.

Dogs do sometimes carry dangerous types of *Salmonella*; it is an additional reason for strict cleanliness in preparing food after handling dogs.

Control measures include protection of food against rats and mice and obvious sanitary precautions, including thorough examination of animals before slaughter.

Botulism, which in hot countries is an extremely rapid and fatal form of food poisoning due to toxins elaborated by *Clostridium botulinum*, does not occur in New Zealand.

Cow Pox

More annoying than dangerous, cow pox is caused by a form of variola or pox virus known as vaccinia. It is the same essentially as the virus causing the dreaded smallpox, which, it is estimated, killed 60,000,000 persons during the 18th century alone, and even last year an outbreak occurred in Scotland which caused the death of six persons. This outbreak was started by an Asian seaman, and many people who had the merest contact with him, such as medical students in the hospital, became infected. Mass vaccination with cow pox vaccine undoubtedly saved a disaster.

Fortunately for the human population, once the variola of smallpox has been passed through a cow it is changed to variola vaccinia and in this form will protect humans against smallpox but cannot change back to produce smallpox again.

Popular reading has made the phenomenon of the unblemished complexions of dairymaids during the 18th century and Jenner's classical vaccination experiments widely known. Jenner's experiments did much to eliminate one of the great scourges of the Middle Ages. Mortality figures for England and Wales show how much the world owes to Jenner and cow pox vaccine. In 1871 vaccination of infants was made compulsory in Great Britain. Between 1867 and 1876 there were 52,281 deaths from small pox; between 1907 and 1916 there were 139. Deaths from smallpox now are rare in Great Britain. Smallpox does not occur in New Zealand, but the disease could be introduced by air transport.

There are forms of variola which attack other animals: Horse pox, which also affects man and cattle; sheep pox is confined to sheep, in which it is severe; and swine pox, which will attack pigs, sheep, goats, and man. The type of animal pox of most interest to man is, however, cow pox, because it is in this form that the virus can be used to protect humans against smallpox. Vaccination is done with material specially prepared from cow pox lesions in calves.

Actinomycosis or lumpy jaw.

Swine Erysipelas

The organism responsible for swine erysipelas is very widespread in New Zealand and since the introduction of derris and benzene hexachloride dips it has caused lameness in sheep after dipping.

The organism (*Erysipelothrix rhusiopathiae*) is said to occur in three strains, human, swine, and mouse, but all may be identical. However, swine erysipelas can and does affect humans, gaining entry through cuts and other skin injuries. It is not often fatal, but generally produces painful local swellings where the germs gain entrance.

Farmers and others handling sick or dead pigs should treat any cuts or scratches, as infected fingers are extremely painful.

Tetanus

Tetanus is a fairly rare disease in New Zealand, but wounds, especially if gained near stables or horse paddocks, may be infected, particularly if they are at all deep or penetrating —even puncture wounds due to walking on nails.

Normally, the tetanus bacillus lives in the intestine of animals without causing any harm and forms spores by which it perpetuates itself. Once these spores are introduced into body tissues through a wound they may develop to produce a poison which enters the nerves causing terrible spasms which very frequently are fatal. Lockjaw was the old and very descriptive name for tetanus.

Tetanus spores are present in many soils, for example, in gardens which have long been manured with horse and cow dung. Away from direct sunlight the spores will persist for years and they are not destroyed by the usual household disinfectants. Tetanus anti-toxin injections should be given for any deep, penetrating wound whether in man or animals, as it is essential to neutralise the toxin formed in the body before it reaches the central nervous system.

In recent years there was a case of talcum toilet powder being infected with tetanus spores, and quite commonly lambs are infected at docking, particularly where rubber rings are used to remove the tail, as there is a contaminated area of dying tissue left round the tail bone.

Fortunately, it seems that all strains of tetanus bacilli do not produce virulent poisons, so that all infected wounds do not necessarily end in tetanus.

Besides anti-toxic serum, active immunisation can be given against tetanus, and doubtless many servicemen owe their lives to the "tet. prop." injection which was a nuisance at the time, but did remove tetanus from the hazards of war.

Gas Gangrene

Gas gangrene or blood poisoning is due to organisms which also are very frequently intestinal inhabitants of domestic animals. These organisms are spore forming and spores when introduced into human or animal muscle tissue produce lesions akin to blackleg in calves and blood poisoning in sheep; gas bubbles out, and bloody fluid oozes from dying and dead tissue. Immunisation is again possible, and whereas in the First World War many wounded died from gas gangrene, there were only a few cases in the last war. Penicillin now gives an added means of combating the infection.

Diseases at Present not Found in New Zealand

Although the list of diseases already mentioned might seem formidable, the most serious diseases so far have been kept out of New Zealand.

Rabies

New Zealand has prevented the introduction of rabies by prohibiting the importation of dogs from countries other than Great Britain and Australia. Quarantine, unless very lengthy, which is expensive, is of little use in controlling rabies, as the incubation period before the clinical symptoms are noticed may be up to 9 and even 12 months, or symptoms may appear in 15 days.

Great Britain imposes 6 months' quarantine on all dogs entering from abroad, and in the last 4 years has had nine cases of rabies develop in quarantine.

In America rabies is extremely common; if it gained entry here it would be a tragedy. Humans, particularly children, are extremely susceptible to rabies, or hydrophobia as it is sometimes called. Bites from rabid dogs

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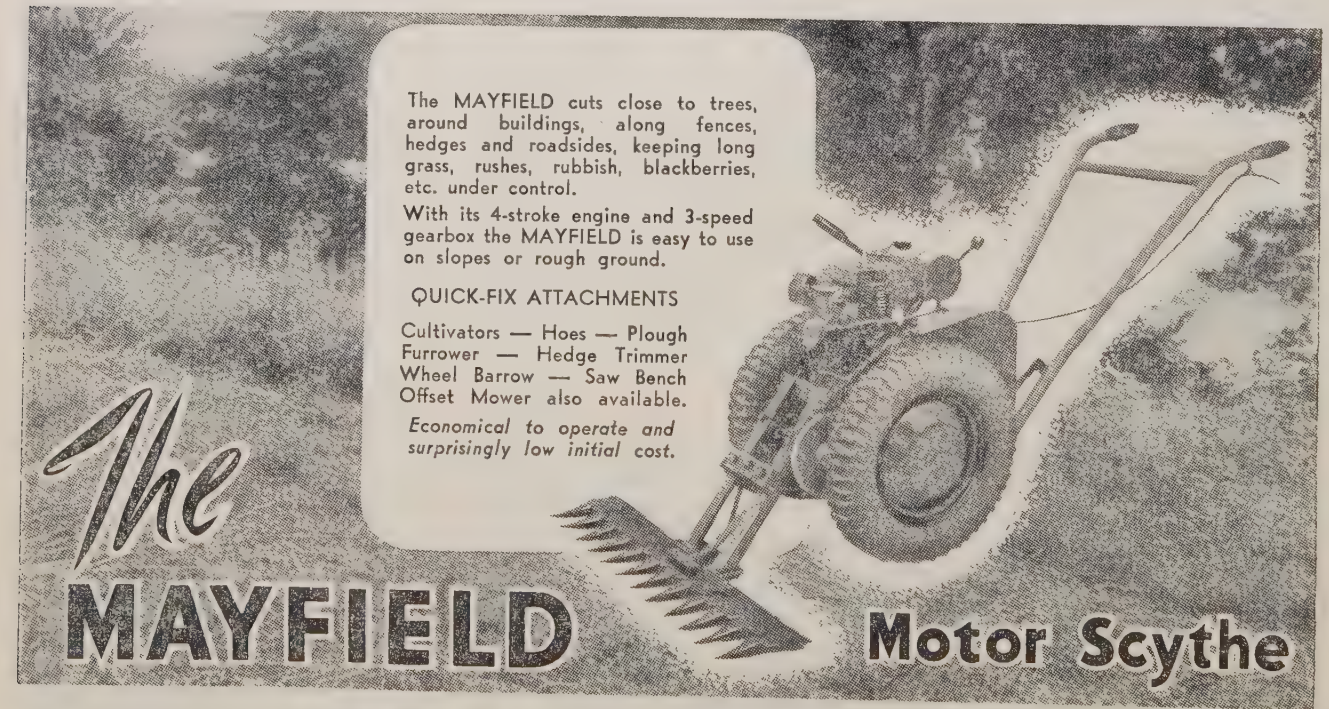
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are the most important method of infection, especially as the usual type of "mad dog" bite occurs on the face and neck, which are close to the brain.

Dogs show the disease in two forms, the "furious" and the "dumb". Probably the most important early symptom is the entire change in the nature of the dog, after which the "furious" symptoms develop and the dog rushes about snapping its jaws, which drip with saliva. In the "dumb" form paralysis of the jaw sets in and the animal soon dies.

Cats also can be infected and could be a grave danger, as they are very hard to control.

Immunisation is the main method of control, and when this has been done in certain States in America the incidence of rabies has fallen rapidly; however, since all animals and humans are susceptible, it is much more important to keep the disease out than to immunise susceptible animals once it has arrived.

Anthrax

In New Zealand human anthrax is not a problem and cases of humans contracting the disease are unknown. In animals, too, anthrax has occurred on only a very few farms over the years, and the efficient measures taken by the Livestock Division of the Department of Agriculture at the time of occurrence have completely controlled and confined the disease.

Outbreaks can usually be traced back to a history of previous deaths occurring at the beginning of the century when "green", unsterilised bone fertiliser was imported from overseas. The spores of *Bacillus anthracis* can exist for 60 years or more in the ground, and if during farming operations the remains of stock which died from anthrax many years previously are unearthed, it is very simple for stock to become infected through eating still-living spores.

In most overseas stock-raising countries anthrax is very prevalent, although the incidence is partially controlled by widespread use of vaccines. In New Zealand vaccination against anthrax has been carried out by the Department of Agriculture as a preventive measure on farms where the disease has been confirmed in earlier years.

[*After Hull.*

Swine erysipelas affecting the human hand.

All farm animals are susceptible, but fowls are almost immune. Symptoms are few in the first cases found; the animals stagger, fall, and die, usually with bloody fluid coming from the body openings. Then there are acute cases, where there is high fever and excitement followed by a staggering, drowsy condition, and death in convulsions. Some cases are less acute and here the condition persists for a few days before the animal dies. Generally the neck is swollen. Pigs may be infected by access to blood from a known case of the disease in cattle or sheep. In the pig the prominent symptom is swelling of the throat, but pigs are more resistant and do not die as rapidly as cattle.

Where an animal dies suddenly from an unknown cause, great care is necessary to eliminate the possibility of anthrax before the carcass is opened up or handled. A thorough investigation will always be made immediately if sudden deaths or untoward symptoms are reported. Cases of blackleg have occurred in adult cattle; but no cuts at all should be made in any animal which might have died from anthrax, as once air is allowed to reach the blood, spores are formed which would infect the whole area permanently.

Anthrax is transmitted to humans by handling infected material. Overseas it has always been an occupational hazard in persons handling wool and hides, and anthrax infection of the lungs is known as "wool sorters' disease". In such cases a very serious form of pneumonia is produced by inhalation of spores into the lungs with dust; however, most cases of infection from skins occur when spores gain access through scratches and cuts. This is a very real danger in skinning cattle which have died from anthrax. The usual lesion in the skin is a pustule surrounded by a spreading, tense, reddened area similar to a boil in appearance. If it is not treated in a few days, there may be a serious general infection of the blood.

Cow pox on udder and teats.

It is not necessary to have direct contact with an infected animal; some cases of anthrax which occurred in humans were traced to infected shaving brushes made from imperfectly sterilised bristles imported from China. One infected brush had been used for 2 years before anthrax spores gained access through a cut on the owner's face and set up infection.

Control of anthrax in animals prevents infection in humans. Vaccination of animals likely to be infected must be done annually with a special type of vaccine. Fortunately penicillin has been found to be effective against anthrax and in combination with antiserum gives added protection to those exposed to the disease, but persons handling dead stock would be well advised to treat all cuts and scratches with a reliable disinfectant.

Leptospirosis

Leptospirosis is another disease which is carried by dogs and which can infect man. The usual reservoir of infection is the rat, which does not seem inconvenienced by the blood parasite causing the disease. Dogs become infected by sniffing rat urine which contains the organisms or by eating infected rats, but they may also carry a strain of leptospiral organisms which are never found in rats.

Leptospirosis in humans is a serious and often fatal disease. It is found in most other countries and is common in Japan. The organisms enter through small injuries and probably through mucous membranes, as people have become infected by handling infected dogs and by swimming in water contaminated by animals.

Diseases from Horses

Horses have very few diseases which can infect humans, but there are two exotic diseases which are dangerous.

Glanders, which has been known since the time of Hippocrates (450 B.C.), is an extremely painful disease

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of man. It had a world-wide distribution, but quarantine, control of import and export of horses, and a diagnostic "mallein" test have reduced the incidence. Horses are allowed into New Zealand only from Great Britain and parts of Australia, areas which are free from glanders. Fortunately the world incidence of glanders is decreasing, but a close watch is kept on horses entering New Zealand even if they come from countries known to be free.

Equine encephalo-myelitis, which is an extremely important disease in the U.S.A., is the only other disease of horses which it is necessary to discuss. There are two strains of the virus concerned, the eastern and western, and the disease is found naturally in horses, sometimes in certain birds, and in man.

In horses the disease takes 2 weeks to develop and mild cases show a peculiar gait and lack of spirit. More acute cases stagger and fall and may show convulsions and die. In man the onset is rapid, especially in children, in whom the disease resembles poliomyelitis.

The disease, which is transmitted by mosquitoes, and infectious anaemia similarly spread cause a ban to be placed on the import of horses from the U.S.A. It would be a severe blow to the horse industry of New Zealand if these two diseases were introduced, besides adding to the list of human complaints.

Rats spread disease. Every effort should be made to exterminate rats and great care should be taken to avoid creating conditions that encourage them.

[*After Hull.*

Swine erysipelas in a pig, showing the diamond-shaped markings.

Pig Diseases

Trichinosis: There are not many serious diseases of pigs which can be passed to man, but trichinosis has long been known as one of the worst. It was this disease which was responsible for the ancient Jewish prohibition against the use of pork. Infected pork or bacon contains the encysted larvae of a worm, *Trichinella spiralis*. If infected pig meat is eaten imperfectly cooked or raw, the larval worms come out of the cysts and invade the lining of the small intestine of the new host. Here female worms are fertilised and deposit living young, which migrate in the blood stream all over the body and penetrate the muscles. The disease in an early state is difficult to diagnose in infected pork and special methods are necessary. Rats may carry the disease and by this means it could be introduced into New Zealand.

All pig meat should be properly cooked, as there is no cure for trichinosis.

Tularaemia, a disease often spread by fleas and lice, but also directly through handling infected animals, is primarily a disease of rodents, especially rabbits, but is easily communicated to man. It is a fairly serious disease which is becoming increasingly widespread since its discovery in 1921. Tularaemia has laid low most investigators who have worked on it, as the bacterium responsible, *Pasteurella tularensis*, is extremely infective. The disease in man produces a serious fever from which recovery is very slow.

Q-fever

Q-fever is a disease of cattle caused by a rickettsia, a tiny organism which has a world-wide distribution. It was first described in Australia in humans (1937). Q-fever is a cattle disease, but man is infected by inhaling dusts contaminated by tick excreta or animal secretions. It can be spread by drinking raw milk where cattle are infected.

In humans the disease may take the form of a serious fever with muscular pains, which on subsiding leave a feeling of persistent lassitude, or it may be merely a mild dose of influenza. The rickettsial organism (*Coxiella burnetti*) is not harmed by penicillin or sulphonamide drugs, but may respond to aureomycin. Other rickettsial diseases fortunately known here by name only are scrub typhus, rocky mountain spotted fever, and murine typhus.

The rickettsias are usually spread by ticks, and the brown dog tick found in Australia has been shown to carry *Coxiella burnetti*.

Diseases Transmitted by Birds

Avian tuberculosis: This was referred to in the first part of this article on page 281 in last month's "Journal".

Psittacosis: Most people know of "parrot fever" or psittacosis, which is not confined to parrots, but is also found in canaries and finches. The organism responsible is a virus and the

disease is widespread, having first been brought into prominence after a large number of persons had died following contact (in some cases quite slight) with a shipment of South American parrots. Cases have occurred all over the world, but the disease has not been recognised in New Zealand. Usually humans have become infected following the purchase of caged birds, although often the birds showed no symptoms; even casual visitors to a house might be infected.

The habit common to bird fanciers of putting the face close to the cage has been responsible for many deaths in humans. Infected dust from the cage or droplet infection from the beak is the usual method of transmission. In man, influenza-like symptoms and pneumonia result, and death often follows.

As a means of stopping further epidemics almost all countries have placed an embargo on export of parrots of all types, but extreme care must be taken to see that the disease is not imported into this country with finches and other birds.

Newcastle disease: This is probably the biggest plague of the poultry industry overseas. It has not so far reached New Zealand. Newcastle disease can be transmitted to humans from infected fowls; in adults it resembles influenza and in children poliomyelitis. There is a possible close relationship between the virus of Newcastle disease and that causing human mumps.

Plague

The final disease to be discussed, plague, is the most terrible. It is not a disease of domestic animals, but finds its host in the rat. There are two types, bubonic and pneumonic. Bubonic plague is spread to humans by infected fleas; pneumonic is spread directly from human to human by droplet infection after it is initiated by a bite from an infected flea.

During the 1500 years before the Christian era there were 41 epidemics of plague which must have killed millions.

At the height of one epidemic which spread along the trade routes in 542 A.D. the mortality was 5000 persons daily.

During the Black Death, which originated about the middle of the 11th century in Mesopotamia and spread over the civilised world, reaching its peak in the 14th century, it is estimated 25,000,000 people died of plague. In London between 1664 and 1665, 70,000 people died out of a total of 500,000. When the Cape of Good Hope route was discovered and most of the trade between India and Europe followed that route instead of passing through Asia Minor the epidemic subsided. The last great wave began in 1871 in China and is not yet completely terminated.

Man and many animals, including rats, are susceptible to the plague organism, *Pasteurella pestis*, but cattle, pigs, sheep, and dogs are not. Bubonic plague is a disease of hot countries and spreads rapidly there; in colder countries spread is accidental and not so rapid. The brown or Norway rat is largely responsible for spreading plague, but all rodents are dangerous. Many species of fleas also act as carriers, the European rat flea being the worst.

In man, bubonic plague is the most prevalent type, accounting for 75 per cent. of the cases, always following the bite of an infected flea. The name bubonic refers to buboes or swollen lymph glands draining the infected area. There is high fever and great prostration.

Pneumonic plague is a lung infection with plague bacillus and is transferred from human to human by droplet infection. Rats and fleas do not enter into the spread of this type except to start the epidemic. Pneumonic plague is usually a disease of winter and cold climates.

Control of plague lies largely in destruction of rats, and fumigation of ships sailing from plague-infected ports is important. Guards on ships' hawsers must be correctly adjusted. Vaccines have been developed, but are not universal as yet, and the main safeguard is still, as before, to destroy rats.

Vigilance Necessary

The list of diseases discussed by no means exhausts the total, but it does cover many of the more important maladies which occur in New Zealand or could be introduced. There are few really major problems at present, but the aim must be to keep New Zealand free from introduced diseases by maintaining adequate control of the import of stock and other animals, by maintaining the necessary standard of quarantine, by a strict check on all ships' pets, and on the possible smuggling ashore of potentially dangerous animals, by destroying rats, and finally by the co-operation of an intelligent and well-informed public, both farmers and town dwellers, with the Livestock Division of the Department of Agriculture to ensure that any apparently unusual disease appearing in animals, whether farm stock, poultry, or pets, is correctly diagnosed.

With these safeguards there is no reason why New Zealand should not remain as it is at present—more free from serious animal diseases than any other country in the world.

Simple Method of Locking Garage or Shed Doors

THE principle of a simple door fastener used by Mr. W. Langguth, of Pyes Pa, Tauranga, is shown in the accompanying diagram. The fastener consists of two slides, upper (2) and lower (6), the upper slide engaging into the recess (1) at the top of the door frame and the lower slide fitting into a block sunk into the ground below the door. These locking slides are mounted in guides and cover-pieces of wood as shown in the diagram. A single thickness of roofing fitted between the cover-piece of the slide guides is sufficient to allow of easy operation.

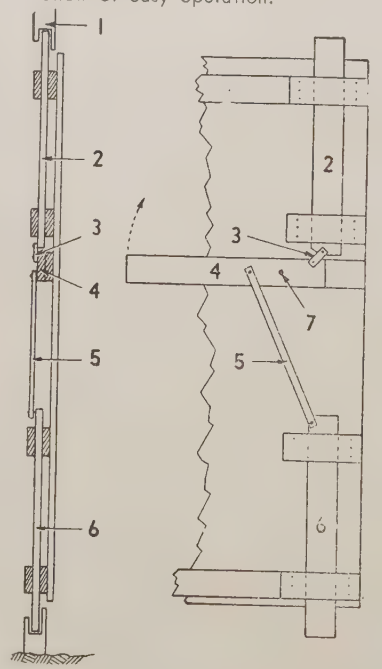
The lower slide should be longer or heavier than the top one so that the device is self-locking. A weight on the end of the operating bar will help if necessary.

These slides are moved by an operating bar (4) which is he'd in place on the door by (7), a gap of at least ¼in. being left between the upper slide and the operating bar.

On each side of (7) are fitted the operating straps (3 and 5) which pull the slides up and down. These should be fastened about 5in. on each side of the screw or bolt (7), the point of fastening being moved further away from (7) if greater movement is desired.

The device is best mounted inside the door and operated from the outside by a rope fastened through the door to the bar (4). The upper slide should be constructed first and then held in position temporarily with a nail until the lower slide is completed. Washers should be used on each side of all bolts used.

The device, which can be made out of odd pieces of timber found on the farm, is cheap and simple to construct and will provide a neat and permanent fastening on any farm door.



—A. V. ALLO, Instructor in Agriculture, Department of Agriculture, Tauranga.

Avoiding Losses of Bee Stocks in Winter

Seasonal Notes for the Domestic Beekeeper Contributed by the Horticulture Division.

CONSIDERABLE losses of bee stocks occur in New Zealand apiaries each year because some beekeepers do not provide proper housing conditions for the bees during winter. This article, contributed by the Horticulture Division, describes the fundamentals of successful wintering of bees.

HONEY bees cannot live alone. Their structure and instincts fit them for life in a colony where the various duties are divided among the individuals according to their structural fitness and age.

A colony consists of three types of bees, a queen, a few hundred drones at certain seasons, and from 15,000 to 75,000 workers. The honey bee is able to survive only through the co-operative efforts of the three types of bees in the colony.

Each type has seasonal duties and the motivating impulse of the entire colony apparently is to ensure the survival of the species rather than the individual. Most insects have the ability to hibernate, but honey bees do not.

Length of Adult Workers' Life

Worker bees perform all the labour of the hive in a fairly definite routine. Their normal life during the seasons of active flight is from 6 to 8 weeks, depending on the amount of work they do, but during winter, in all cold climates, when they are less active, they may live for several months, including a comparatively short period in mid-winter when they remain clustered together in a semi-dormant condition.

A normal colony of bees in mid-winter consists of 15,000 to 20,000 workers and a single queen, quietly clustered within the hive, where the colony by its co-operative numbers is able to maintain a temperature sufficient to sustain life during winter. The bees are able to do this by consuming honey stores and by muscular activity within the confines of their cluster.

The highest temperatures in the cluster may vary between 75 and 85 degrees F., with the temperature at the edges of the cluster down to 57 degrees F., or as low as 41 degrees F. in extremely cold climates, at which point individual bees become chilled and die.

Seasonal Work of Honey Bees

The honey bees' year may be divided into two periods. The first part consists of the winter season, when there is no brood rearing and when the colony merely strives to survive the period of cold, until it can again carry on its field activities of gathering nectar, pollen, water, and propolis. In the second part of the bees' year there is a feverish attempt to build up the population of the colony in expectation of the main summer honey flow, which in New Zealand usually begins in December or January, according to the locality.

There may be exceptions to these definite periods of activity in some northern parts of the North Island, where winter conditions are very mild, and brood-rearing continues to some extent during winter.

From these facts some valuable beekeeping practices have been established which enable beekeepers to maintain normal bee stocks in their hives all the year round.

Protection from Winds

When hives are in exposed positions cold penetrating winds enter hive entrances and all openings caused by ill-fitting or badly constructed appliances. These conditions should be avoided. Provided the hives are reasonably sheltered and all hive parts are rain-proof and close fitting, the bees are quite capable of maintaining the temperature necessary for their comfort in changeable weather. Where these precautions are not taken, however, colonies usually open up weak in spring and low in stores; also most of the bees have dark-tipped, shiny bodies indicating worry and loss of vitality through overwork in attempting to keep up the normal temperature within the cluster during winter. Heaps of dead bees will be found either on the floor board or outside the main hive entrance, and the heavy mortality rate will continue as long as wet, cold, draughty conditions within the hive continue. This can be avoided only by giving attention to suitable shelter and by placing close-fitting hives in dry surroundings.

However, beekeepers should not go to extremes. Any attempt to provide artificial warmth would induce brood rearing at a time when such activity is not desirable. This would cause a heavy consumption of stores that could be ill afforded and would not allow the queens the rest they require if they are to be of good service the following season.

Winter Housing

Individual beekeepers may have their own ideas and special methods of housing their bees in winter according to local beekeeping conditions, but, in general, wintering bees in two full-depth hive boxes is suitable to New Zealand conditions in most localities.

The method has the following advantages over the single-box method: 1. The colonies can be wintered without undue disturbance of the bees in autumn, or interference with autumn brood rearing for the winter supply of young bees, which is very important. 2. It is possible to leave a well-stocked super of capped comb honey on each hive for winter and early spring stores. 3. There is ample comb room for storage of honey from any unexpected late source in autumn and for the formation of the winter cluster in the most suitable location next to the food mass. 4. An enormous saving of labour, transport, and inside storage room for boxes is effected in large apiaries.

Final examination of well-stocked super, showing outside comb containing some capped honey.

In the final preparation all surplus supers above the second box should be removed from the hives; a quick glance at the brood for signs of disease is also desirable. Where queens are not too old and are in fair condition they need not be replaced before winter.

With the provision of clean, dry mats, strong, watertight, close-fitting lids, and hive entrances contracted to keep out cold winds and possibly mice, the hives should require no further attention until early spring.

Materials for Table Mats and Napkins

Attractive table mats and matching table napkins can be obtained in or made in a wide range of materials. Shown on this page are: Upper left—Crochet table mat. Upper right—Hemstitched plain linen mat. Middle—Floral linen mat. Lower left—Bamboo table mat. Lower right—Fringed hopsack table mat.

Setting the Table

MOST New Zealand women can look only with envy at the beautiful pictures of table arrangements in overseas magazines. They display complete sets of china that seem to be made for each particular photograph. Mats or table cloths harmonise perfectly with the cutlery and the crockery, as well as with the food and the flowers; and they are available in what seems to be a never-ending supply. The results are inspiring, but hardly practical. Nevertheless, there are ways of making simple table settings attractive, and even odd pieces of china and glassware can look well together if some care is taken to set the table imaginatively. A few simple rules and some suggestions for table arrangements are outlined in this article by Helen Paine, Rural Sociologist, Department of Agriculture, Wellington.

BEFORE attempting any new and imaginative arrangements for setting a table, it is wise to do some stocktaking, and know exactly what basic necessities such as china and silverware are at hand. Most people possess one dinner set. Some keep it for special occasions; others use it every day. In either case it is worth trying to set the table so that all meals are eaten in a pleasant atmosphere. Food is more palatable and meal times more congenial if attractive colours and well-balanced arrangements are used on the table.

When buying a dinner set it is wise to choose one that will match a wide range of colours, one that will harmonise with both plain and patterned backgrounds; for if china is of simple, good design, it will suit many occasions. It will be able to be dressed up with fine linen, silver, and crystal to look well at a formal dinner, and it will also look correct at a gay luncheon with brightly coloured mats and wooden accessories. Sooner or later all dinner sets need replacements, so it is wise to buy a stock pattern and purchase additions as they are needed, but, if this not possible, odd pieces of the same shape in contrasting colours make a lively variation.

Taking Stock

The first step is to take stock of the available china and silverware; then it is wise to look over the supply of tablecloths, place mats, and napkins. Of the different ways of making china look right on many occasions the simplest is to have a variety of table mats and several table cloths. It is not an expensive addition to the linen cupboard to supplement the existing stocks of these articles, especially if material is bought by the yard and made up at home. It is an added advantage if a wider choice of colour and pattern is available. It is no longer necessary to spend hours of patient labour embroidering place mats and tablecloths, for though fine linens are still the most satisfactory for formal occasions, a great variety of novel materials is available for everyday use. Mats of coarse burlap in bright colours or of folk weaves in gay patterns are easy to make and simple to launder. In fact, any material which can be frayed is suitable for making into a table mat. Furnishing linens and heavy dress linens both give attractive results; the skirt of an old dress that has worn out in the bodice can often be cut up into mats quite satisfactorily.

Size of Mats

The choice of material for a place mat is the main influence on its size, but there are two schools of thought on this. If the mat is big, it must be a substitute for the tablecloth, in which case each one must be large enough to take the plate, the silver, and the glasses or a cup and saucer; if it is small, it is covered by the plate, and the silver and glassware are placed on either side of it. The large mats must be made of material that can be cleaned easily; good heavy linens that can be washed frequently and need no starching are suitable, and the coarse woven materials already mentioned possess the additional asset of being uncrushable.

Hardboard Mats

At present there is a vogue for mats that can simply be wiped after each meal. Various hardboard materials can be cut up for mats, sandpapered, painted with imaginative designs, and coated with a clear, heat-resistant varnish; they are, of course, a great labour-saving device, as are the newer plastic mats. As plastic lies very flat on a surface, plastic cloths and mats are most suitable for a children's meal setting, either on a table or for the tray of a high chair, because there is less temptation to pull at the cloth and upset the meal. Plastic mats will look gay and attractive if surrounded by a frill of their own material. They are very suitable for hurried breakfasts, but it must be remembered that plastic material suitable for table mats must always be protected from very hot ovenware and is therefore most useful for cold meals.

In addition to the materials mentioned—linens, burlaps, folk weave, plastic, and hardboard—which are all suitable for everyday use, glazed chintz and plaited flax mats have the same virtues. These types of mats should be made so that the finished size is at least 12in. x 9in. and not larger than 16in. x 12in. The smaller size is most suitable for a dinner mat, which has only to be large enough to hold one plate at a time, but breakfast and luncheon place mats are more satisfactory if they are larger. The suggested sizes can be cut from material which is 36 or 48in. wide without any waste.

Some people prefer small mats that are completely covered by a dinner plate, and a variety of special materials is suitable for this type. Laundry problems are not so difficult, because the small mat is protected from soiling by the plate which covers it; therefore delicate laces, organdies, and fine embroidered lawns can be used with less fear of wear and tear; or a figured linen can be cut into circles, each one including a complete pattern; then the mat can be bound or bordered with satin stitch. Glazed chintz patterns can often be treated in the same way. Lace mats or mats of shadow-stitched organdie are, of course, luxuries to buy and time consuming to make, but they give a dainty air to a table setting that the coarse materials can never achieve.

SETTING THE TABLE ATTRACTIVELY . . .

There are many patterns available for crochet and tatted mats, both in coarse and fine materials, that would appeal to any housewife who had a little time to spare.

Table Napkins

Just as the enormous white damask tablecloth has given way to one more in keeping with modern housekeeping practices, so has the huge, white, stiffly starched serviette gone out of fashion. For a dinner party or a meal with guests small napkins which match the cloth or the mats are the most suitable, the chief advantage being that they are not difficult to launder. The big serviette, however, still has a use in everyday family meal service. It is sometimes satisfactory to make napkins and mats of the same size so that they are interchangeable. If 12 mats are made six can be used as place mats and six as napkins at a special dinner, or all can be used in rotation for family meals; having the extra number means that it is necessary only to wash each one as it soils, replacing it from the general pool instead of washing all the used mats at the same time. It is more satisfactory to use all the mats in rotation in case the dye of a few of them fades with constant washing or the material loses its crispness, in which case all the mats no longer seem to belong to the same set. Small napkins to match the place mats or a cloth can be made of the same material only if it is a cotton fabric or linen of a weave that is not too coarse. All but the heaviest furnishing linens are suitable for napkins and can be finished with a simple hem, by fraying, or with one of the various hem-stitches. If the napkins are to be interchangeable with the mats, both will be the same size; if not, they are best cut square. A minimum size is 12in. x 12in., and the maximum for ease in laundering is 24in. x 24in.

Any good embroidery book will give instructions for hem-stitching and other ways of finishing mats and napkins too detailed to be described here.

Fraying a Mat or Napkin

To fray a mat or napkin first straighten the material by pulling out a thread and cutting along the line from which it has been withdrawn. When all sides have been straightened pull out threads to mark the boundary of each mat and then cut along these lines. From the edge of each mat pull out threads until there is ½in. of frayed material at each border. Then it is advisable to machine a line of stitching to prevent further fraying.

If a more finished product is desired, the material can be hem-stitched ½in. from the edge of each mat after the material has been straightened and cut; then the outside threads are frayed.

Only materials that are coarsely woven are suitable for fraying; very fine linens and fine cottons begin to look bedraggled as soon as they lose their freshness.

Table Setting

Even with a good dinner set and a well-stocked linen cupboard, it is necessary to know the conventional methods of setting the places at a table to suit different occasions. Of course, there are many ways of setting an informal buffet meal, the success of which depends largely on imagination, but for everyday meals, the following rules are correct:—

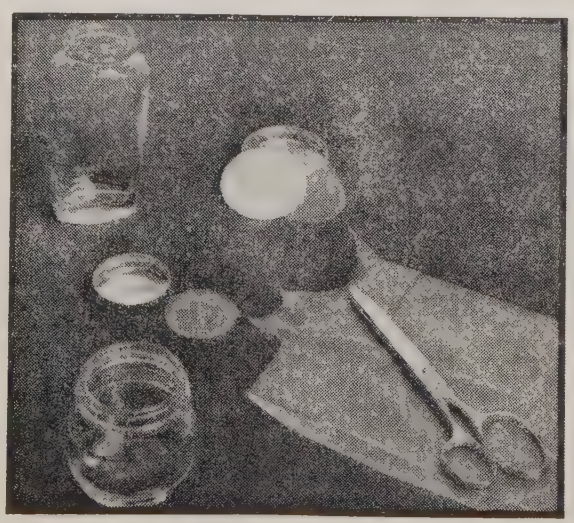
1. Leave enough space on the place mat to hold the biggest plate used during the meal.
2. Arrange the silver just beyond this area so that those articles which are used first are placed on the outside; in other words, the person using the silver picks up the pieces on the outside first and works inward. (This is unimportant nowadays except at a hotel or a very formal meal where an array of silver might be confusing.)
3. The cutlery should be placed about 1in. from the edge of the table, the napkin on the left of the place mat, and any glasses just above the tip of the knife.

Any table accessories should be carefully selected and of suitable size, pattern, and texture to match the place mats and the china. For instance, coarse pottery can be well matched with wooden salt and pepper sets and an earthenware vase; fine china is better set off with silver or crystal.

Finally, the centrepiece of the table should provide a focus for attention without being too conspicuous. Flowers have always been the most popular adornment; at any season of the year it is hard to better a good arrangement of fine blooms set in the right bowl, but it is still amusing to try some original motifs. Fruit, even vegetables or corn, can make an attractive centrepiece, but it must be on the right occasion at the right meal.

Paper cut-outs are successful for a children's party, and a miniature Christmas tree brightened up with tinsel is effective for a festive dinner on Christmas Day, especially if children are present to enjoy it.

Growing plants, small pot plants, or bowls of growing bulbs are nearly always attractive, and of course their permanence saves time once they have been planted. Other ideas can be gleaned from almost any magazine one picks up, but it must be remembered that imagination and adaptation play the biggest part in fostering new fancies.



Sealing Jars and Bottles with Plastic Skin

SMALL screw-topped jars of odd sizes which come into the household from various sources are often useful for packing small quantities of food for school lunches or picnics. Their use as temporary containers for food can be extended if the lids are lined with circles of the plastic skin used for preserving. This skin is impervious to liquids and prevents contact between the metal of the lid and the food. If the skin alone is not sufficient to make the jar watertight, a layer of thin cardboard placed in the lid before the circle of skin is inserted will make it so. Similarly, a small circle of plastic may be used to line the cap of a screw-topped bottle. Plastic material wrapped round a cork before it is put into a vacuum flask prevents any odour or mustiness from the cork giving an "off" flavour to the liquid.

—EDITH G. McNAB, Rural Sociologist,
Department of Agriculture, Timaru.

The Culture of Succulent Plants in the Flower Garden

THE value of succulent plants for ornament in the garden and house has long been recognised and in recent years their popularity has grown tremendously. In this month's article for the flower gardener C. K. Ellis, Horticulturist, Department of Agriculture, Dunedin, discusses their cultivation and some of the species and varieties widely known in New Zealand.

Two sections of the cactus and succulent house at the Dunedin Botanic Gardens. The plant in the centre foreground below is a euphorbia.

THE name "succulent plant" used in a general way covers all plant species with fleshy habit, including the members of the family *Cactaceae*, but this article discusses broadly the species other than cacti, because the family *Cactaceae* contains many more than 1500 species and these are a study on their own.

All succulent plants are not cacti. Many families including normal herbaceous flowering plants have representatives in the succulent plant group. Some of the families represented are *Amaryllidaceae, Chenopodiaceae, Compositae, Geraniaceae, Liliaceae,* and *Vitaceae.*

Geographical Distribution

Though the cactus family is almost entirely indigenous to the American continent, normally central and the southern part of north America, representatives of the succulent families are distributed in the natural state over much wider areas. The main region where succulent plants flourish is South Africa, in places such as the Great and Little Karoo, the Kalahari, and Cape Province. Also noted for their succulent flora are parts of North Africa, the Canary Islands, parts of the Riviera, Mexico, and Central and South America. In these localities climate and soil conditions are generally unfavourable to vegetation, so that only plants capable of adaptation to these conditions are successful.

The districts in which succulents grow are normally characterised by heat and dryness, and soil temperatures may rise to as high as 130 degrees F. at noon and fall to as low as 32 degrees by night. Air temperatures of over 100 degrees are not uncommon and the relative humidity of the air may never exceed 20 per cent. The extreme fluctuations of temperature cause heavy dews to fall during darkness, and this may be the only source of overhead water supply.

Conditions are fairly similar on many high mountain ranges, where strong winds and rapid loss of heat by insulation, causing extreme drying of foliage, create conditions as unfavourable to vegetation as those in the desert. Here again Nature has produced plants capable of adapting themselves to the conditions, and many of the succulent plants now in cultivation are natives of such regions. Sedums and sempervivums are typical representatives of the flora of high alpine regions. In these plants modifications such as extremely long roots and protective hairs or waxy coverings on the leaves assure rapid absorption of water and effectively reduce loss by transpiration. Succulent plants of this nature occur widely in the European Alps and the mountains of Central Europe.

Similarity of form to that of dry-region plants occurs in certain species growing on sea coasts and in the salt deserts. When the soil is impregnated with salt absorption by the plant of food materials and water becomes difficult, and the adaptations of the plant in such localities obviously are again to prevent rapid loss of water and to ensure a constant supply for the plant's vital functions. Examples of plants in this group are salicornias, some sedum species, and several species of mesembryanthemum.

Value of Succulents

Not only their flowers and unusually attractive foliage, but also their ease of cultivation, make succulent plants valuable to the home gardener. Some require the protection of glass, verandas, or balconies, but in summer many can be used as decorative plants in the garden. A very large number of species are suitable for cultivation in rock gardens.

Many succulents require a great deal of skill in management, but the great majority can be grown with ease by the average amateur. These plants often succeed indoors where other types of pot plants invariably fail, possibly because the structure of many modern buildings is of a type which tends to reduce relative humidity to a point unfavourable to normal plants.

Positions with little sunlight each day are not the most favourable and a site with a northerly aspect should be chosen. However, even succulent plants may be damaged, especially behind glass, by excessive sunlight, particularly if the foliage is wet. Therefore ventilation should always be adequate.

Before the plants to be grown are chosen, it is as well to acquire some knowledge of their growth, form, and cultural requirements. The best first choice are those which are easily grown.

Culture of Succulents

As a general rule shading for the plants is unnecessary, but some species benefit from a light shading wash over the glass during the hottest months. If plants are grown in a heated glasshouse, they should be arranged on staging so that the pipes give bottom heat, and the temperature preferably should not be allowed to drop below 50 degrees F. during winter. In unheated houses that is not possible, but the plants can be protected through the severest cold by keeping the soil dry.

Succulents are usually grown in pots, and the pots should not be allowed to rest directly on the staging, but should be separated from it by a layer of weathered coke breeze or sharp sand. A good effect is obtained by plunging

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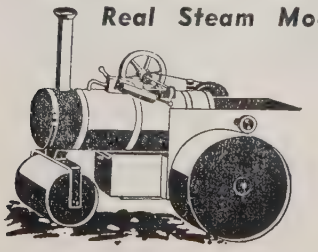

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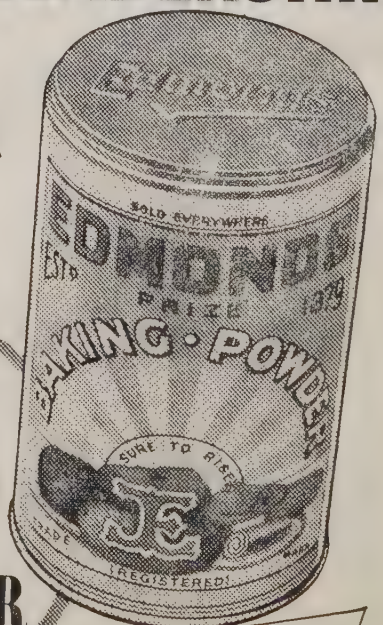

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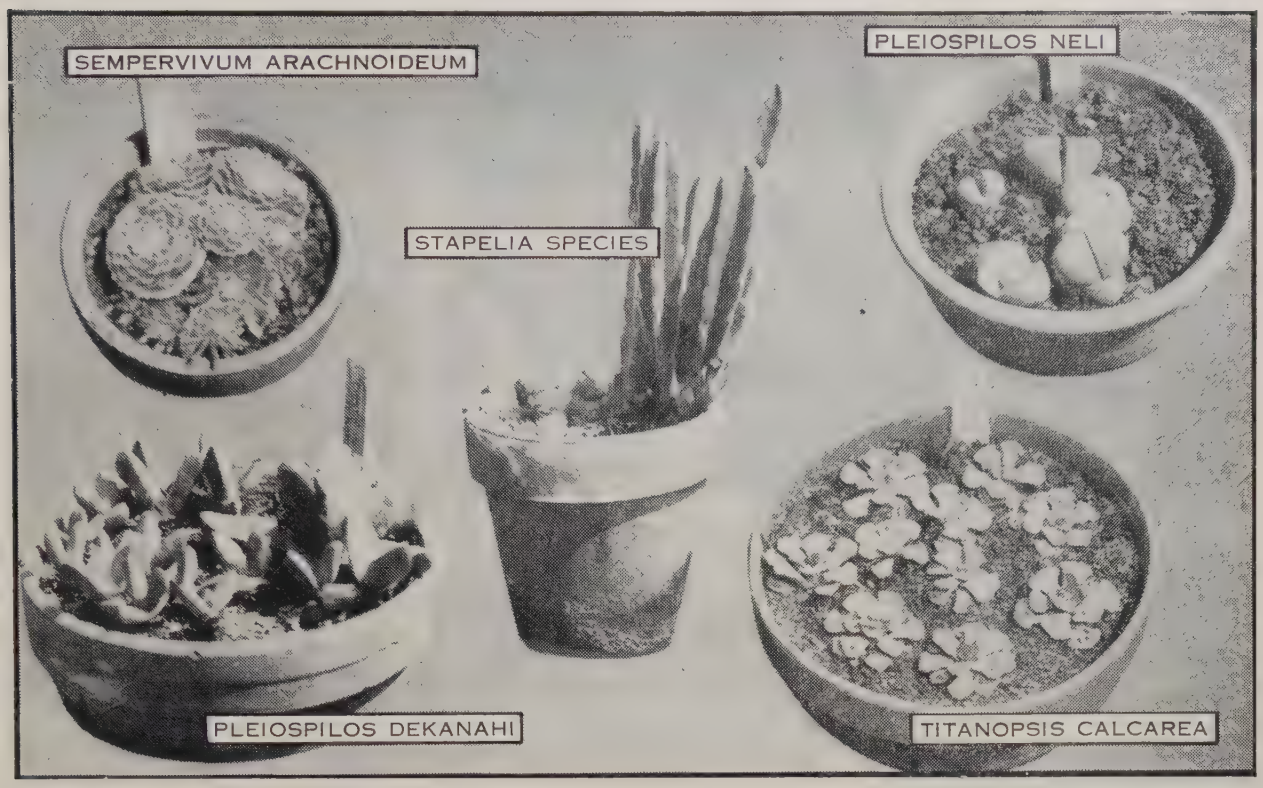


the pots in a 6in. layer of the material; the surface can then be decorated with a few larger stones, giving the gardener opportunity to create landscapes in miniature. Species such as *Lithops*, *Pleiospilos*, *Dinteranthus* and *Titanopsis* are particularly good for this type of work. Plunging also has the advantage of keeping the soil in the pots moist for longer periods during the growing season, and some moisture is retained in the lower levels of the plunging material and is available to the plants should they need it. Their roots will grow vigorously through the bottoms of the pots to seek out such moisture.

A small section of the staging can be set aside for propagation. A wooden frame about 8in. high and covered with a glass window is set on top of the bench or staging to serve as a propagating frame for cuttings and seedlings.

Watering Succulents

The most important aspect of the cultivation of succulent plants is watering. In their native habitat the plants experience varying periods of drought which serve as resting periods. Such periods should also be observed by the gardener when growing succulents under artificial conditions. The resting period is best imposed during winter, as the plants are less likely to be damaged by cold when the soil is dry, but some species will not conform to this practice; for example, *Conophytum* begins to grow about late November and its resting period is in spring, whereas *Nananthus* and *Dactylopsis* grow during winter.

During the resting period the plants should be watered very sparingly, for they will withstand almost complete drought for several months. Even considerable shrivelling of the foliage does not mean that the plant is approaching death; after a very short period of watering the foliage will swell again and begin to grow.

The species which prefer half shade, such as the gasterias, should not be completely dry. Plunging the pots to keep them moist is preferable.

Stapelias should be kept sufficiently moist to prevent shrivelling of the roots during winter.

All euphorbias should be watered freely during the growing season only.

Echeverias require a moderate amount of water during winter and especially at the time of new root formation in spring.

Normally all succulent plants should be watered freely in the growing season, which is usually short. Syringing the foliage of succulent plants is not advisable; damping down of concrete paths, staging, or pot rims is sufficient.

Clay pots and pans, because of their porosity, are the most suitable receptacles in which to grow succulent plants. Each must have a drainage hole at the base through which superfluous water may pass.

The size of the pot should conform with the amount of root produced by a plant. Aloes, for example, should be given large pots; *Lithops* and *Nananthus*, because of their long taproots, should be given small but deep pots; and gasterias and stapelias require shallow pots or pans.

Soil for Succulents

Heavy but extremely porous soil is probably best for succulent plants. Fresh soils containing a large amount of humus are not suitable. Old, weathered loam mixed with a good proportion of old and well-rotted leaf mould is the ideal basic soil. Old mortar rubble, crushed brick, finely sieved ashes, and finely broken charcoal are all useful for increasing the porosity of the soil.

Artificial fertilisers should not be used, small quantities of old manure being sufficient to provide nourishment.

Coarse sand should be added in liberal quantities and may form up to two-fifths of the final mixture. For large, vigorous plants the mixture should be coarse, but for smaller, more finely rooted types it is better sieved into a finer state. Some types, such as the crassulas, require much more humus than most other types. In general, if the soil is rich in nitrogenous matter, the plants grow too vigorously, becoming fat and unsightly.

Re-potting Succulent Plants

If re-potting is necessary, it should be done at the beginning of the growing period. Strong-growing plants need re-potting annually. With the smaller-growing types re-potting at least each 2 years is advisable, because the roots are likely to become infested with pests such as mealy bug.

All photographs of succulent plants by Jack Welsh and Sons.

FLOWER GARDEN WORK FOR MAY

Cactus dahlia Lady's Fancy. In districts with a hard climate dahlias cannot be left safely in the soil during winter.

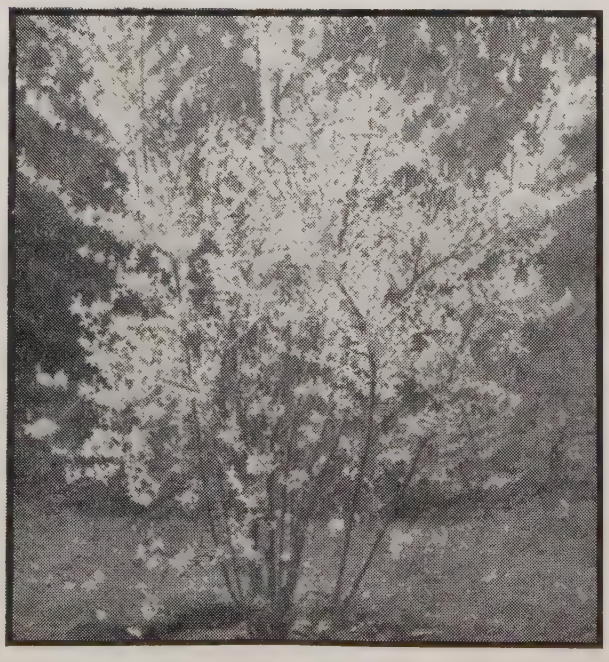
Annuals sown earlier for spring flowering should be thinned out to an inch or two apart as soon as they can be handled. Further thinning is necessary as the plants become larger, until finally they are thinned to 8 or 9in. apart by the time they are in flower. Annuals that have been raised in boxes from seed, or self-sown seedlings lifted from the borders, can still be planted out in vacant spaces in borders in very mild districts, but elsewhere planting out these seedlings is probably better delayed until the end of winter.

Cinerarias should be inspected from time to time. The "woolly bear" caterpillars that can devastate cinerarias later in the season can usually be kept down by hand picking at this time, but spraying with D.D.T. in spring and early summer is well worth while.

Chrysanthemums are usually left in borders from year to year in the milder districts, but where sharp frosts are experienced it is safest to lift the stools in autumn, label them, and plant them in a cold frame for the winter. Little water or attention need be given them through the winter, but these plants will provide a good supply of cuttings for propagation later.

Cuttings will form new roots only if there is a continuous supply of air to the cut surfaces, where the new roots will appear. Success with cuttings depends on, among other things, the texture of the soil in which they are put to root. Silty soils, such as those in many New Zealand gardens, run together when watered and form a crust when they dry. The more often they are watered the tighter this crust becomes and the more difficult it is for air to pass through it. Cuttings in a pot, box, or frame must be damped down often until they root, and they root badly in a silty soil because the supply of air to their roots is insufficient. Now is the time, when the cold frame is more or less empty, to make sure that the texture of the soil in it is suitable for propagating. A liberal addition of coarse, gritty sand does much to open the texture of the soil, prevent it from caking when watered, and so ensure a good supply of air to the bases of the cuttings to be propagated next season.

Dahlias left in the ground from the previous year produce the earliest blooms, but they cannot be left outdoors safely in districts where winters are hard. Except in the mildest districts, the roots are best lifted, dried off, and stored for the winter in any place where they will be protected from frost. They do not require a warm place, temperatures between 35 and 40 degrees F. being satisfactory. In fairly mild districts the roots can be kept beneath an evergreen hedge if shed storage is not available. In mild districts where dahlia roots are customarily left in the ground through the winter it is advisable to lift them in late winter at least every 3 years and divide the old roots or replant single tubers taken from the outside of the old clump, making sure that each tuber has at least one bud on its neck.



Forsythia viridissima

THE shrub *Forsythia viridissima* is one of several species often referred to as the Japanese golden bell-tree which are free-flowering deciduous shrubs varying in height from 4 to 12ft. Some have an erect habit and others arching growths, and *Forsythia viridissima* is one of the erect type. The almost-leafless branches are wreathed in very early spring with a profusion of golden-yellow, bell-like flowers, to be followed by fresh, green foliage.

The shrub thrives in a rich, well-worked soil and grows under much the same conditions as roses. Though it is hardy, a sheltered position protects the brilliant display of early blooms from strong winds or driving rain.

Best time for planting is in autumn after leaf fall. As all forsythias flower most freely on well-ripened wood of the previous season's growth, they are pruned fairly hard immediately after flowering. This enables the bushes to produce during summer strong young growths on which the next season's flowers will be borne.

Plants may be propagated by inserting cuttings of soft wood about 3in. long in a warm sand frame in December or January. However, the usual procedure is to propagate by hard-wood cuttings (that is, ripened wood of the current year's growth) 9 to 12in. long and about the thickness of a lead pencil and plant them out in March, April, or May.

—H. P. THOMAS, Vegetable Instructor,
Department of Agriculture, Wanganui.

Photograph by Douglas Elliott.

Dead flower heads should be removed regularly even in winter if the borders are to be kept in flower for as long as possible. They should always be cut off with a knife or scissors or pinched off with the thumb nail, and never be pulled off, as pulling is likely to wrench the roots and may even result in some annuals being pulled out of the ground.

Deep digging does more than anything else to encourage the large, deep root systems which are necessary if plants are to grow well. Plants with shallow roots are sensitive to dry conditions when the surface soil dries out, whereas deep soils remain moist for much longer and roots can draw a constant supply of moisture from the deeper layers. The mixed flower border offers less opportunity for deep digging than the vegetable garden, but every opportunity should be taken to dig borders, even though only small areas can be dug at a time. Digging in autumn is especially beneficial, as rain soaks more readily into soil that has been broken up and much badly needed moisture will run off the surface instead of soaking into the soil if flower borders are left with hard surfaces through the winter. All hard surfaces should now be pricked lightly with a fork even if the ground is occupied and cannot be dug over. The aim should be never to let the ground become hard, but to loosen the surface whenever it shows signs of caking to make sure that rain can soak in instead of running off.

Herbaceous plants in the borders should continue to be lifted, divided, and replanted after the digging and manuring of the site.

Paths infested with weeds can be cleared effectively by spraying them with an arsenical weedkiller. This can be made up at home by mixing 2 parts of white arsenic and 1 part of caustic soda in a large container. Add water to the dry mixture, which heats rapidly until it boils. Finally add 10 gallons of water for each 1lb. of white arsenic in the mixture. Spray the liquid thinly but evenly on the path so that each gallon of the mixture covers about 20 sq. yds. of surface. The treatment usually gives a good kill of weeds and remains effective for some months. Arsenic, of course, is poisonous, and proper precautions must be taken in mixing the spray, using it, and cleaning out the utensils afterward. White arsenic is dangerous if inhaled, and breathing in of the powder should be avoided.

Planting time for most trees, shrubs, and herbaceous plants extends from about May to early October. The ad-

Paths and drives infested with weeds can be restored to the immaculate condition of this one, and maintained so for several months, by the treatment recommended on this page.

Sweet peas should be given as long a growing season as possible. In mild districts seed can be sown in May to give plants like this for setting out in August.

FLOWER GARDEN WORK FOR MAY

[*Department of Scientific and Industrial Research photo.*
Spotted wilt symptoms on chrysanthemum leaves.

vantages of autumn planting are that the soil is still relatively warm after summer and plants usually form new roots quickly. The cool, moist conditions of winter are least trying to newly planted stock. On the other hand, winter storms are likely to rock shrubs and trees planted in autumn, as they have not had time to produce new anchorage roots, and a very wet spell in winter often kills newly planted stock outright if the soil is poorly drained and becomes waterlogged. Spring planting is likely to result in less trouble from waterlogging by heavy winter rains, but the plants have less time in which to form deep root systems before the onset of hot, dry summer weather. Spring planting is best if the soil tends to be wet in winter.

[*Photo News Photo Ltd. photo.*
Chrysanthemum plants affected by eelworm.

Pot plants should be trained as bushy specimens and not be allowed to become leggy. Young fuchsias, balsams, and geraniums potted up as rooted cuttings to flower next year should be pinched several times as they grow to produce well - branched plants. Pinching means the removal of the tip of the shoot while it is still soft enough to be squeezed off between the finger and thumb nail.

Sweet peas should be given as long a growing season as possible. In early districts where the site will be ready for planting by July or August seeds should be sown now in pots or boxes in a cold frame. They should be given quite hardy conditions and need the protection of the frame light only in really cold weather. Seeds are sown 1½in. apart and 1in. deep.

Pests and Diseases

Chrysanthemum plants are often affected by eelworm, which results in the leaves drying prematurely and shrivelling. This pest can be controlled properly only by treating the stools with hot water in winter and planting them in sterilised soil. Cuttings from plants treated in this way are free from eelworm. If they are planted in soil not affected with eelworms, these plants will grow into healthy specimens retaining all their leaves to the ground.

Mildew on a variety of ornamental garden plants can best be controlled by a sulphur fungicide. The most effective method is to use a liquid spray such as lime sulphur, colloidal sulphur, or, best of all, a combination of the two, but the use of sulphur sprays is limited seriously in the flower garden by the fact that all these liquids discolour paintwork and cannot be used safely near the house. A fairly satisfactory method of combating all the common mildew diseases on flowering plants is to use sulphur in the form of a dust—either flowers of sulphur or a proprietary sulphur dust. Dusts are not as efficient as liquid sprays, but are reasonably effective if applied uniformly, preferably in the early morning when the plants are still damp with dew. One method of application is to put the dust in a piece of cheese-cloth, tie the bundle to a stick, and shake the stick or tap it with another to drive off a small cloud of the dust. However, that method is wasteful, and every home gardener will find a hand duster a good investment.

Spotted wilt virus disease of tomatoes is carried over from year to year on a variety of plants, especially on dahlias, lettuces, Iceland poppies, and nasturtiums. Dahlia roots marked earlier as virus infected and any of the plants named which show spots on the leaves or are stunted, malformed, or in any way abnormal, should be dug out and burnt. Rigorous elimination of infected plants that are carrying over the disease from year to year gives at least some hope of reducing losses in next season's tomatoes.

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BOOK REVIEWS

"New Zealand Farm and Station Verse" and "My First Eighty Years"

STATE Literary Fund grants have been worthily applied to assisting the publication of A. E. Woodhouse's collection of "New Zealand Farm and Station Verse" and Helen Wilson's "My First Eighty Years".

An introduction to "New Zealand Farm and Station Verse" by L. J. Wild puts the collection in its proper perspective. It is not all poetry, but most of it is obviously sincere, some is good verse, and all of it is valuable not only as an illustration of the evolution of verse-making but as a reflection of rural life since the early days of settlement. Mrs. Woodhouse is well qualified to make the selection for this anthology, and its content should appeal to all who know and love the land. The volume is well illustrated by prominent artists and cartoonists, whose work shows that graphic art has played no small part in recording impressions of farm and station life.

In "My First Eighty Years" Helen Wilson reminisces with marked literary ability on a lifetime spent in a wide variety of places and among a host of people and events important in colonial development. As well as being a most entertaining story, the work should be an important source for later historians. It records pioneering in the Mackenzie Country and in the South Canterbury, Manawatu, and King Country districts. As an early Dominion President of the Women's Division of the Farmers' Union and as the wife of an M.P. and the sister of Sir Hubert Ostler, the writer had opportunities of observing closely the social and political life of her time.

—*G.J.N.*

"New Zealand Farm and Station Verse": A. E. Woodhouse. Whitcombe and Tombs Ltd. 12s. 6d.

"My First Eighty Years": Helen Wilson. Paul's Book Arcade. 12s. 6d.

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CARE OF PRESERVING JARS AND LIDS

Above—The best way to remove a self-sealing lid without chipping the top of the preserving jar is to make a hole in the lid with a pointed tool before lifting it. New lids should be used each year. Below—The simplest and safest way to open a screw-topped preserving jar is to pull out the rubber ring before trying to unscrew the top. Inserting an implement between rubber and lid is likely to damage the lid.

THE climax to successful preserving is the attainment of the perfect seal on the jars which will ensure the keeping qualities of their contents. On this page Edith G. McNab, Rural Sociologist, Department of Agriculture, Timaru, offers advice about the care of preserving jars and their lids.

NEVER prise up a self-sealing lid when opening a jar, but pierce the lid with a pointed tool before lifting it off. Prising up a lid risks chipping the top of the jar so that it cannot be used again with a self-sealing lid. Piercing the lid to open the jar ensures that the same lid will not be used a second time by mistake.

Remove the screw bands from jars of preserved fruit after the jars have cooled. If left on, they are likely to corrode and be difficult to remove when the jars are to be opened. If the jars are kept upright, new self-sealing lids are used each season, and the tops of the jars are level and smooth, leaving the screw bands on is not necessary. Sealing results from the tendency for a vacuum to form in the jar as the contents cool. Once the jar is cold the screw band serves no useful purpose, and it will not help if a seal has not been formed. The screw band may be used again.

Sometimes a jar has two little ridges at the top, which may be sufficient to prevent sealing, whether self-sealing lids or screw tops are used. These ridges in the glass may be removed with a fine file.

Screw-topped jars are best opened by gripping the rubber ring and pulling it out. Then the lid will unscrew easily. Some rings are made with a protruding piece to give an easy grip; others can be gripped between the thumb and the back of a knife to be pulled out. Trying to open a jar by inserting an implement between rubber and lid is likely to bend the lid so that it will be of no use next season. Slight bends can be removed by putting on the rubber, screwing up the lid tightly, and using the back of a knife to lever down the bent edge against the glass.

The seal may be tested by putting about 2in. of water in the jar, putting on the ring, screwing up the top tightly, and leaving the jar upside down. If no water escapes, jar and lid can be used for preserving.

Above—If a jar has two small ridges on top, they should be filed off. The jar must be rinsed thoroughly afterward to remove any powdery glass which may have fallen into it. Below—A bend in the edge of a screw top can be removed by holding the back of a knife in the bottom groove and pressing it down against the rubber ring and the rim, working round the edge for some distance on either side of the bent part.

THE MUSEUMS OF NEW ZEALAND

IN this series of articles Enid B. V. Phillips has described the founding of 18 metropolitan and provincial museums in New Zealand and has discussed their collections and the historical background of many exhibits. This, the concluding article in the series, deals with the Te Awamutu, Otaihape, and Westland Museums.

Gavin Gifford Memorial Museum, Te Awamutu

THE founder of the museum at Te Awamutu, Gavin Gifford, who was a son of a soldier who served in the Maori Wars, died little more than a year ago. His interest in the history of the district where he was born and lived all his life made him an enthusiastic promoter of the Te Awamutu Historical Society, which he helped to form 15 years ago in order to investigate and record the history of the locality. He not only suggested the establishment of a museum as part of the society, but provided the nucleus with his own private collection of native birds, Maori weapons, tools, and similar exhibits. These he housed in an upstairs room of a two-storeyed building he owned in the main street of the town.

His public-spiritedness did not end there, because, in addition to cataloguing and arranging the exhibits, he acted as curator and guide, and on several occasions, owing to the original collections being frequently augmented by gifts of historical and ethnological importance from interested persons, he moved the exhibits into larger rooms. (For some years they have occupied a big room, and though this is the largest space available, it is inadequate for the effective display of the constantly increasing collections. Meanwhile the Te Awamutu Borough Council assists the society financially in housing the exhibits until a permanent museum can be built.)

Mr. Gifford was always pleased to welcome townsfolk and tourists alike to the museum, but undoubtedly his keenest and most consistent visitors were scholars from the large primary and secondary schools in the vicinity. The colourful stories of the countryside took on a new significance when these boys and girls could gaze upon the korowai, the cloak worn by Te Kooti, or examine the silver-mounted cavalry belt belonging to a member of the Te Awamutu Cavalry, a volunteer body formed in 1871 by Major William Jackson, commander of No. 1 Company of Forest Rangers during the Waikato War. No. 2 Company was in charge of Major G. E. von Tempsky, whose journal describing the Rangers' part in the campaign, including the epic siege of Orakau, is now in the Alexander Turnbull Library, Wellington. The museum, however, possesses an impressive display of relics of the intrepid von Tempsky, who was killed in the battle against the Hauhaus at Te Ngutu-o-te-Manu, Taranaki, in 1868.

The wooden headpiece from a grave at Te Rore, where General Cameron had his headquarters for a short time, is another poignant reminder of the Maori War of 1864.

Mementoes of an earlier and more peaceful period are the quaint diamond-pane windows from the mission house erected in Te Awamutu in 1841 on a site chosen by the Rev. B. Y. Ashwell. For nearly 20 years the mission house, which was demolished by the Te Awamutu Borough Council in 1930, was the home of the Rev. John Morgan, "Te Mokena" of the Maoris, who not only ministered to their spiritual needs but instructed them in pakeha methods of agriculture to such good purpose that they became noted for the excellence of their wheat and supplied Auckland with a considerable quantity of wheat and flour. Indeed, at one time flour mills were quite a familiar feature of the landscape, and a pinion from one of these early mills is now in the museum.

Much grassland in the district was originally sown by Mr. Morgan. The historian James Cowan, F.R.G.S., son of William A. Cowan, of Orakau, one of Major Jackson's lieutenants in the Te Awamutu Cavalry, relates that while travelling from one Native village to another it was Mr. Morgan's habit to sow grass and clover seed as he went along, using the novel means of a seed bag suspended from his dog's neck; from the bag seeds dropped one at a time as the animal trotted beside its master.

[From the Alexander Turnbull Library photographic collection.
The mission school at Otawhao, near Te Awamutu, conducted by the Rev. John Morgan last century.

Early Mail Contract

Among the multitude of photographs, letters, maps, plans, newspapers, and other records of local interest is a photographic copy of a contract for the cartage of mails from Auckland to Rangiaowhia, near Te Awamutu, between the Postmaster-General and a Maori in 1852, the route being via Manukau Harbour, Waiuku, and the Waikato and Waipa Rivers, as the alternative route, the Kawhia road, was too rough.

A reproduction of a picture by the gifted artist G. T. Angas, "The Maketu House", the carved Maori house at Otawhao which he painted in 1844, has a place of honour in the museum. Some outstanding pieces of ancient Maori carvings of various kinds, tools and weapons found in the Te Awamutu district, and a collection of kauri gum and a variety of Melanesian weapons and artifacts are displayed.

Nautical relics include the picturesquely named "go-ashore" (the sailor's cooking pot), a large model of the clipper Cutty Sark made by an old sailor, and a gruesome assortment of surgeon's tools dating back to 1840.

Domestic exhibits of the pioneering days are mostly of the practical type, such as buttermaking tools (comprising pats, instruments for cutting the butter into pounds, and wooden "hands"), but the item which holds most charm for visitors is a big musical box brought to New Zealand in 1833.

A modern souvenir is the brass nameplate from the machinery of the Horahora electric power station, the first on the Waikato River. The plate, mounted on a plinth of three different kinds of timber from the station buildings, was presented to the museum by the hydro-electric engineer at Hamilton.

Otaihape Museum

Like the museum at Napier, the Otaihape Museum owed its inception in 1928 to the local philosophical society, Mr. P. Pedersen being one of the founders. Unfortunately, its span of life was short, a mere 6 years, and when the museum committee disbanded, the exhibits, which mainly comprised birds and Maori artifacts, were given into the custody of the borough council, who in turn presented to the Taihape District High School that portion of the collection which the school could conveniently house. It is hoped when the new high school is erected that provision will be made for sufficient space to display the remainder of the collection as well.

Westland Museum, Hokitika

The Westland Museum, which was founded in 1907 and which occupied a spacious room in the library building, was administered by a committee appointed by the Hokitika Borough Council. It is now temporarily in suspension, and, pending reorganisation of the museum, the historical exhibits and collections of ethnological, biological, geological, and mineralogical specimens are being stored in the Canterbury Museum.

Re-covering an Eiderdown

[*Sparrow Industrial Pictures Ltd. photo.*

WHEN a bedroom has been redecorated, or even spring cleaned, the eiderdown may suddenly appear hopelessly shabby. Leaking dust or feathers, rubbed patches at corners, and fading and staining of the fabric may have reached the point at which some reconditioning becomes necessary if the quilt is to be kept in use. Dry cleaning will freshen an eiderdown, but very worn or faded material should be replaced. Real down quilts are easier to buy now than a few years ago, but remain expensive, whereas a few yards of material and careful workmanship will make an old one as good as new. Soft furnishing departments of some shops will do the work, but a housewife with a sewing machine can accomplish it quite well herself. This article by Norma K. Metson, Rural Sociologist, Department of Agriculture, Wellington, deals with the choice of material, methods of work, and the decorative touches which help to give a professional-looking finish.

MATERIAL for covering an eiderdown should be light and closely woven, with a smooth finish which will not collect dust. A duplicate of the original cover may be required, but there is a wide range from which to choose and both furnishing and dress material departments may provide suitable fabrics. Special downproof sateens can be bought, both plain and patterned, and are a wise choice when the old eiderdown is losing feathers rapidly. Other possiblities are brocade, satin, taffeta, poplin, sateen, and fine, closely woven cottons, especially those with a mercerised finish. In some eiderdowns a downproof or fine cotton interlining is used on one or both sides, eliminating the necessity for a downproof outer cover. If the eiderdown has one decorative silken side, this alone may be renewed, the more durable sateen on the underside being left untouched.

The new cover may be made as simple or as decorative as the worker pleases. Sections may be frilled, shirred, or embroidered, and seams can be piped or decorated with cord or ruching. Materials of two colours or plain and patterned materials can be used for banding, or on the two sides. At least one side should be non-slippery or the eiderdown will persist in sliding off the bed.

Measuring and Planning

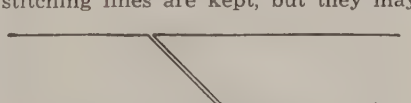
Measure the eiderdown carefully along the outside edges and also along the stitching lines round the centre panel piece inside the border. Look to see if the original cover has been joined, and if so where. In most cases some joins are necessary, but a 48in. material would be wide enough for a single-bed eiderdown. The easiest method is to join straight strips down the sides to make the required width; an alternative is to have a centre panel and border strips joined diagonally at the corners.

Suitable fabrics may be 31, 36, 48, or even 54in. wide, so some calculation will be necessary to find the exact yardage. Turnings of ½in. must be allowed for internal joins and of ¾in. at the outer edges. Any joins must be planned carefully considering, first, that if the material is patterned in stripes or large motifs, they must be matched and placed symmetrically; second that joins should follow lines of structural stitching or decoration so they will not be too conspicuous; and third that they should result in an economical use of material. Extra material must be allowed for frills, shirring, or covering cord.

A diagram of the eiderdown drawn to a scale of 1in. to 1ft. is a help in this planning, and also in the working out of the pattern of stitching or embroidered decoration if the original is not to be followed. In general, the border strips down the sides should be about a sixth of the total width to give a good proportion. If mitred corners are being cut for the border section, it is wise to make a paper pattern before cutting the cloth.

Method of Working

Take off any cord, frills, or other detachable trimming from the old eiderdown, as these would make the edges bulky and the seams difficult to stitch. If there is a lining, the old outer cover should be removed by cutting close to the lines of stitching on one side and pulling the fabric away on the other. Use small, sharp scissors, or a razor blade in a holder, and keep a needle, fine thread, and a small piece of patching material handy, as it is easy to make small nicks in the lining and these must be patched at once. The work is easier if the previous stitching lines are kept, but they may not fit in with the joins necessary in the new material, or the worker may wish to use another design; for example, to emphasise a large floral motif in the fabric. In this case the old stitching should be unpicked. If a new design is chosen, it should consist of long sweeping curves and straight lines; manipulating such a bulky article in the machine is too difficult for fine pattern details to be practicable.



Diagonally cut ends of the border patterns are fitted together to save material.

Decorations such as shirring, tucking, embroidery, or scrolls of braid should be worked on the appropriate sections after the material has been cut, but before it is made up. They are usually put in the central panel, in corners inside the border, or across one corner. Ruching and uncovered cord are sewn on by hand after the cover has been put on. Again, the old patterns may be duplicated or new decorative ideas introduced

Two Methods of Covering

The reconditioning of an eiderdown may be undertaken in two ways—first, by renewing both sides, the cover being made up like a bag to be slipped over the eiderdown, and second, by using a mitred border and centre panel to replace only one side. Here are directions for each method:—

A Complete New Cover

Cut for each side a straight centre panel piece and strips of equal width to be joined on at the sides. These seams should coincide with lines of quilting. If the pattern is striped or a large floral one, it should be centred carefully in the panel and the side strips cut to match. Join strips and centre piece to complete each side, press the seams open, then join the two sections together on three sides and part of the fourth, leaving an opening large enough to allow the eiderdown to be put in. If covered cording or a small frill is to be used as trimming, it must be tacked into this seam before being stitched; across the open section it will be sewn to only one side. Press all seams and the whole cover thoroughly.

RE-COVERING AN EIDERDOWN

Pinning the central panel on the new cover.

Take careful measurements and make a pencil-and-paper diagram of the quilting pattern to be followed. With tailor's chalk or very fine pins, mark on the new cover a few of the most important guiding points in this pattern. Keep the number of pins to a minimum, as the marks they leave in a closely woven or delicate fabric are difficut to remove. Use a fine needle and cotton for tacking.

Slip the eiderdown into the cover, pushing the corners well down at the bottom and smoothing the new cover until it is spread evenly. This work should be done on a very large table or the floor. Anchor the cover with a few pins at corners and along the sides and close the opening in the cover with fine hand stitching. Then, following the pattern diagram, tack and machine each section of the quilting in turn, working from the border inward. Complete the tacking and machining of each section and remove the tacking stitches before going on to the next part. Tack firmly with short stitches, looking frequently at the underside to make sure that the stitches remain straight and that no folds of material are being caught up. If the quilting is not following the old lines, flatten the area to be stitched as much as possible and ease the down out of the way. For machining, loosen the tension a little, use a medium stitch, and stop frequently to smooth the underside of the work.

When the machining is finished, uncovered cord or ruching may be sewn on by hand, eyelet holes made, or decorative hand sewing such as chain stitch worked over the machining in parts of the pattern. If the cover has become crumpled with handling, it can be smoothed by holding the eiderdown in one hand and running the iron lightly over the surface. It must not be pressed flat.

Patterns for quilting should be composed of straight lines and sweeping curves.

Renewing One Side

Measure the centre panel carefully and allow ½ to ⅝in. turnings when cutting the material. Measure the width of the border piece and the outer and inner edges at end and side. Cut paper patterns for one end and one side piece, allowing ½in. turnings on the pattern. When cutting the material place the pattern pieces so that the sloping ends fit together neatly, eliminating waste. Tack and stitch the diagonal corner seams and press them flat, being careful not to stretch the material. Press the whole border, then with the eiderdown flat on a table or the floor pin the border in place.

Turn under the outer edge, insert any trimming, then tack and machine or hand sew round the outside. If there is another row of stitching between outer edge and centre panel, tack and machine this also. The inner edge of the border is left free.

After completing any embroidery or similar decoration place the centre panel in position, turn the edge under, then pin and tack it in position over the raw edge of the border. Stitch round by machine or with decorative hand sewing.

Working from the back, push pins through to the front to mark the quilting pattern, and tack carefully along these lines. Work in sections, from the outside in, and again complete the quilting either by machine or hand sewing. Hand sewing takes longer, but the finished eiderdown looks better, as it is almost impossible to make the lines of machine stitching follow exactly those on the underside. As with the other cover, ruching or cord can be sewn on last.

A light pressing, a little warmth from sunshine or fire to fluff up the down, and a reconditioned quilt is ready for many more years of use.

Country Girls' Clubs

COUNTRY GIRLS' CLUBS aim at instruction in an enjoyable way, the monthly meetings featuring demonstrations, lectures, films, field days, debates, quizzes, singing, play reading, sports, and social events. Demonstrators and speakers include local residents, officers of the Department of Agriculture, tutors of the Adult Education Service, physical welfare officers, and club members. Club programmes are planned by the girls (who are 14 to 30 years) with the help of their advisory members.

This year the annual conference of the New Zealand Federation of Country Girls' Clubs, the third to be held, will be at Timaru in June. The four-day programme will be similar to that of previous conferences and will include as well as the annual general meeting discussions on the conduct of meetings, talks, sight-seeing, and a social gathering.

During April and May, Miss N. Mulholland (Darfield, Canterbury), president of the federation, is to visit 11 of the newest clubs. Girls who wish to join the movement should write to the secretary, New Zealand Federation of Country Girls' Clubs, P.O. Box 3004, Wellington.

PICKLES, SAUCES, AND RELISHES

ONE of the most satisfying sights to any housewife is a storeroom or cupboard full of jars of well-made preserved fruit, jams, jellies, pickles, sauces, and relishes. They are good to look at and give rise to the pleasant thought that the basis of a meal is always available. As they are mostly made from surplus produce from the garden, the housewife can feel happy to have prevented waste. Preserving and jam and jelly making have been dealt with previously in the "Journal", and the making of pickles, sauces, and relishes is the subject of this article by Eva Topping, Rural Sociologist, Department of Agriculture, Auckland.

PICKLES, sauces, and relishes have many uses. They give flavour to sandwich fillings and add interest to savouries and salads. Used in stews and in made-up dishes they add piquancy. They can also be used with cold meat, or with bread and butter, or even as party savouries.

They can be either sweet or sour and can have a variety of textures and flavours, but the method of preserving is always by using vinegar and salt. Spices and sugar are added more for flavouring than for preserving.

Preparations for Preserving

The fruit and vegetables used in pickles, relishes, and sauces should be as fresh as possible and not over-ripe. They should be washed or wiped and left as dry as possible, and any blemishes should be cut out. Some vegetables need peeling and some should have the hard stems removed. Prepare only as much vegetables or fruits as can be handled easily at one time.

Have all the spices necessary on hand and have sufficient vinegar ready to complete the batch. If the recipe calls for brining the vegetables before pickling them, measure the salt accurately, as too strong a brine causes pickles to toughen and shrivel. Cover the pickles well with the pickling liquor and store them in sealed, sterilised jars, as the presence of bacteria or moulds causes pickles to soften and spoil. Pickles, sauces, and relishes, like all other preserves, should be stored in a cool place.

Pickling may be done with either cold or hot vinegar. Cold pickling is used mainly for shallots, onions, cauliflower, and cabbage; these pickles should always be crisp. Hot pickling can be used for all fruits and vegetables. Relishes and sauces are really pickles prepared by the hot pickling process, as relish is finely divided pickle, and sauces and ketchups are sieved relishes; the texture is always softer and the flavours are more blended.

Pickling vegetables in spiced vinegar.

Vinegar and Brine

White or malt vinegar can be used for pickling. White vinegar is generally used for green and white pickles and malt vinegar for all others. The vinegar can be spiced before being used in the following way:—

- 1 quart of vinegar
- 12 peppercorns
- 1 teaspoon of mace
- 1 teaspoon of grated horse-radish if desired
- 1 piece of bruised root ginger
- 1 teaspoon of cloves
- 1 teaspoon of all spice
- Chillies to taste

Tie the spices in a muslin bag and put them into the vinegar in a saucepan. Bring the vinegar to the boil and boil it for 2 minutes with the lid on. Remove the saucepan from the heat and allow it to cool. When the vinegar is cold take out the bag of spices. The vinegar is then ready for use.

To make brine put 1lb. of salt in 1 gallon of water and bring it to the boil. Strain it and allow the brine to cool before using it.

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OBTAINABLE FROM LEADING STORES THROUGHOUT NEW ZEALAND

Mixed Pickles

Take equal quantities by weight of under-ripe tomatoes, cucumbers, cauliflower, and onions. Peel the onions and cut out the hard stalk of the cauliflower. Wipe the tomatoes and cucumbers. Cut up all the vegetables into small, even-sized pieces. Pack them into jars and cover them with spiced vinegar. Seal the jars and store them.

Pickled Onions or Shallots

Pour boiling water over the onions to loosen the skins. Peel them, place in an enamel basin, cover them with brine, and allow them to stand for 24 to 48 hours. Drain the onions thoroughly and pack them into jars. Cover them with cold vinegar and seal the jars. Either white or spiced vinegar can be used.

Green Tomato Pickle

- 2lb. of green tomatoes
- 1 large onion
- 3oz. of treacle
- 1 tablespoon of mustard
- 1 teaspoon of flour
- ½ teaspoon of curry powder
- Pinch each of spice, mace, cloves, and cayenne

Wipe the tomatoes and peel the onions. Slice both into an enamel dish, cover them with brine, and leave them for 12 hours. Mix all the other ingredients and bring them to the boil. Add the drained tomatoes and onions and boil the pickle for 10 minutes. Pot it and seal the pots.

Red Cabbage Pickle

- 1 red cabbage
- 1 pint of vinegar
- Salt
- 6 cloves
- 1 teaspoon of peppercorns
- Slices of beetroot

Remove the outer leaves of the cabbage and most of the hard stem. Shred the cabbage finely, put it in an enamel dish, sprinkle it thickly with salt, and let it stand for 24 to 48 hours. Drain the cabbage in a colander, shaking it well to remove as much liquid as possible. Pack the cabbage into jars.

Boil the vinegar, cloves, peppercorns, and beetroot slices together for 3 minutes. Remove the beetroot, pour the vinegar and spices over the cabbage, and seal the jars.

The beetroot is added to give the vinegar a red colour and may be omitted if desired.

Pickled Gherkins or Cucumbers

- 2 dozen gherkins or small cucumbers
- 1 small onion
- 1 pint of vinegar
- ¼ cup of salt
- ½ tablespoon of sugar
- ½ cup of salad oil

Wipe the cucumbers or gherkins, slice them ¼in. thick into an enamel basin, and sprinkle the salt over them. After they have stood for 3 to 4 hours drain them thoroughly. Mix all the other ingredients. Pack the cucumbers or gherkins in a jar and pour the liquor over them, making sure they are covered completely. Seal the jars.

Sweet Cucumber Pickle

- 2lb. of quartered cucumbers
- 1 tablespoon of mustard seed
- ½ tablespoon of celery seed
- 1 teaspoon of whole cloves
- 1 quart of vinegar
- 2 red peppers
- 2 cups of sugar
- 1 tablespoon of cinnamon sticks
- 1 teaspoon of whole allspice

Cover the cucumbers with boiling brine, stand them for 24 hours, then drain them through a colander. Cover them with fresh cold water and heat them to boiling point. Drain them again and cover them with the vinegar and sugar. Add the spices, tied in a muslin bag, and the chopped peppers and heat the pickle slowly to boiling point. Remove it from the heat immediately and pack it into hot, sterilised jars. If necessary, add more vinegar to cover the cucumbers. Tie down the covers.

Beetroot and Onion Pickle

- 2 large cooked beetroot
- 2 large onions
- 1 pint of vinegar
- ½ teaspoon of mixed spice
- Peppercorns to taste
- Sugar

Slice the onions and beetroot thinly and place them in alternate layers in jars, sprinkling each layer with a little sugar. Bring the vinegar, spice, and peppercorns to the boil and pour the mixture over the beetroot and onions. Take care to let out all air bubbles. Cool the pickle, and add more boiled vinegar if necessary to cover the beetroot and onion. Seal the jars.

Mustard Pickle or Piccalilli

- 2lb. of mixed vegetables
- 1½oz. of turmeric
- Chillies to taste
- 2 quarts of vinegar
- 1½oz. of mustard
- ½lb. of sugar
- 1 tablespoon of cornflour
- 1½oz. of ground ginger

Cauliflower, green beans, onions, chopped marrow, and celery make a good mixture of vegetables for this pickle.

Prepare the vegetables, cover them with brine, and leave them overnight. Drain them thoroughly and pack them into hot jars.

Mix the mustard, ginger, turmeric, and cornflour to a paste with cold vinegar. Put the vinegar, sugar, and chillies and any spices desired into a saucepan, bring them to the boil, and boil them for 2 minutes. Strain the vinegar and carefully mix it with the mustard paste. Return the mixture to the pan and reheat it, stirring it until it thickens.

Pour this sauce over the packed vegetables. Cool the pickle and seal the jars.

Gooseberry Pickle

- 5lb. of under-ripe gooseberries
- 1 pint of vinegar
- ½ tablespoon of allspice
- 4lb. of sugar
- 1 tablespoon of cinnamon
- ½ tablespoon of cloves

Wipe the gooseberries and remove the stems. Put all the other ingredients into a saucepan and bring them to the boil. Add the fruit and boil the pickle slowly for 15 to 20 minutes. Pack it into jars and seal them when they are cold.

Pickled Peaches

- 2lb. of under-ripe peaches
- 1 cup of vinegar
- 1 teaspoon of allspice
- 1 tablespoon of cinnamon
- 1 teaspoon of cloves
- 1lb. of sugar

Dip the peaches into boiling water for 1 minute and then into cold water to loosen the skins; peel them. Boil the sugar, vinegar, spices, and 1 cup of water for 5 minutes. Add the fruit and cook the pickle gently until the peaches are clear—1 to 2 hours. Pack them into jars and seal them.

If a clear liquor is desired, tie the spices in a muslin bag and remove them before packing the pickled peaches into jars.

Sauce Recipes

Tomato Sauce

- 4lb. of ripe tomatoes
- ½oz. of salt
- ½ pint of spiced vinegar
- ½lb. of sugar
- Pinch of cayenne pepper

Wash the tomatoes, cut them up, cook them gently in a saucepan until they are soft and tender, then rub them through a coarse strainer. Add the other ingredients and boil the mixture again, stirring until the sauce is of a creamy consistency. Pour it into hot, sterilised bottles. Boil the corks for 10 minutes and cork the bottles while both are still hot. When the sauce is quite cold dip the corks and the tops of the bottles in melted paraffin wax.

Tomato and Apple Sauce

- 4lb. of ripe tomatoes
- 1lb. of apples
- 4oz. of salt
- 1oz. of peppercorns
- 2oz. of allspice
- ¼ teaspoon of cayenne
- ½oz. of cloves
- 1lb. of brown sugar
- 2 medium-sized onions
- Juice of 1 lemon
- 1 pint of vinegar

Slice the onions, apples, and tomatoes and simmer them with all the other ingredients except the vinegar and lemon juice. When the mixture is tender rub it through a coarse sieve. Add the vinegar and lemon juice and boil the sauce for 10 minutes. Pour it into hot, sterilised bottles, seal them with melted paraffin wax, and screw on the tops when they are cold. If using corks, boil them for 10 minutes, cork the sauce while it is hot, and when it is cool seal the bottles with melted paraffin wax.

Plum Sauce

- 6lb. of plums
- 2lb. of onions
- 2lb. of sugar
- ½ teaspoon of cayenne
- 2 dessertspoons of pepper
- 4 pints of vinegar
- 1 dessertspoon of ground cloves
- 1 dessertspoon of ground ginger
- 2 teaspoons of salt

Wipe the plums, peel and slice the onions, place them in a saucepan with the other ingredients, and bring the mixture slowly to the boil, stirring it to prevent it sticking. Boil it gently until the stones come out of the plums freely. Sieve the mixture or put it through a colander. Bring the sauce back to the boil and pour it into hot, sterilised bottles. Cork the bottles with boiled corks and when the sauce is cold seal the tops with melted paraffin wax.

Apple Sauce

- 1½lb. of apples
- ½oz. of bruised root ginger
- ½oz. of cloves
- 1oz. of peppercorns
- 1lb. of treacle
- 1oz. of salt
- ½lb. of garlic
- Chillies to taste
- 2 quarts of vinegar

Wipe the apples and cut them as for jelly. Gently boil all the ingredients except the treacle in a saucepan for 2 hours. Strain the mixture through a colander, return it to the saucepan, and add the treacle. Boil the sauce for 5 minutes and pour it into hot, sterilised bottles. Cork the bottles with boiled corks and when they are cold seal the tops with melted paraffin wax.

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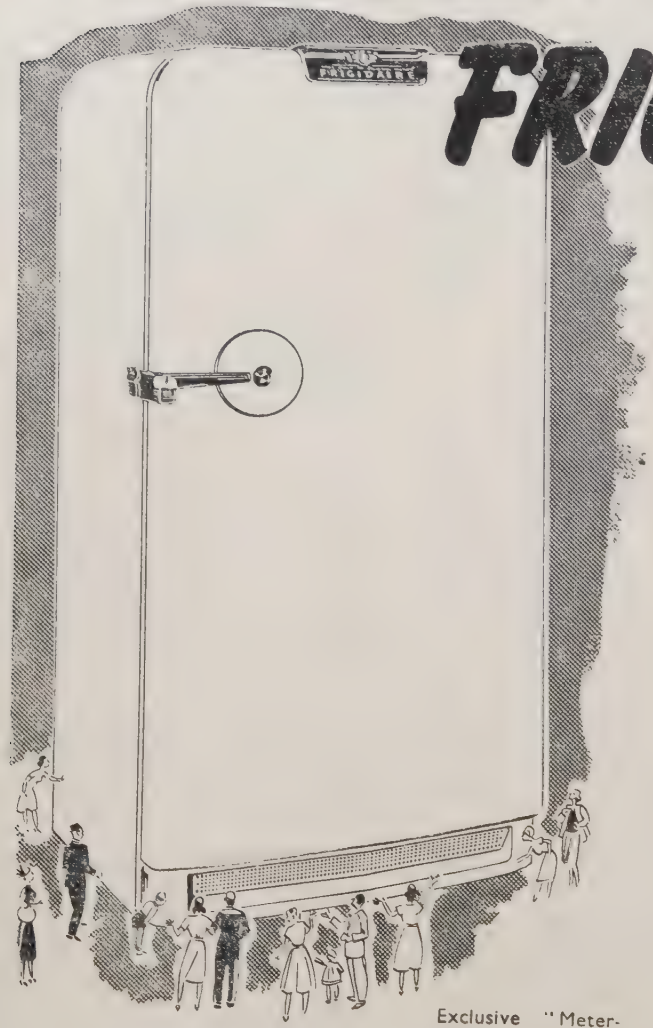

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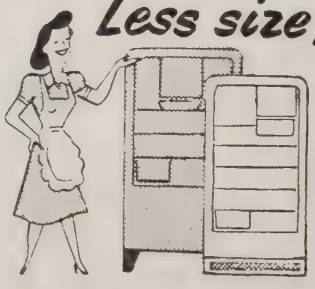

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Ingredients for making relishes and sauces.

Quince Sauce

2lb. of quinces
1lb. of sugar
2 medium-sized onions
1lb. apples
2½ pints of vinegar
1 teaspoon of cayenne
1½ tablespoons of salt
1 dessertspoon of cloves
1½oz. of allspice
Juice of 1 lemon

Wipe and cut up the quinces and apples. Peel the onions and slice them. Put all the ingredients except the lemon juice in a saucepan, bring them to the boil, and boil them gently until the fruit is tender. Strain the sauce through a colander. Add the lemon juice and bring the sauce back to the boil. Pour it into hot, sterilised bottles and cork them with corks which have been boiled for 10 minutes. When the sauce is cold dip the corks and tops of the bottles in melted paraffin wax.

Rhubarb Sauce

5lb. of rhubarb
5lb. of onions
3lb. of sugar
2 tablespoons of salt
Chillies and peppercorns if desired
3 pints of vinegar
1 dessertspoon of mustard
1 dessertspoon of curry powder
1oz. of bruised root ginger

Wipe the rhubarb and peel the onions. Chop the rhubarb and slice the onions into a saucepan. Add the other ingredients and bring the mixture to the boil. Simmer it gently for 1½ to 2 hours. Strain the sauce through a colander and then reheat it to boiling point. Pour it into hot, sterilised bottles and cork them with boiled corks. When they are quite cold dip the tops into melted paraffin wax.

Cape Gooseberry Sauce

2½lb. of cape gooseberries
1lb. of onions
½lb. of brown sugar
½ pint of malt vinegar
1 teaspoon of ground ginger
2 teaspoons of salt
Cayenne to taste

Wipe the cape gooseberries and prick them with a darning needle. Peel and slice the onions. Place all the ingredients in a saucepan and bring them to the boil, stirring constantly to prevent sticking. Boil the mixture gently for 45 minutes. Strain it through a colander. Pour it into bottles, cork them, and when the sauce is quite cold dip the tops in melted paraffin wax.

Peach Sauce

2lb. of peeled and stoned peaches
¾lb. of sugar
¼ cup of salt
1 teaspoon of allspice
1 teaspoon of cloves
6 peppercorns
2 medium-sized onions
Pinch of mace
Pinch of cayenne
1½ pints of vinegar
Paprika if desired

Peel and slice the onions. Put all the ingredients into a saucepan, bring them to the boil, and boil them gently until the peaches are tender. Strain the sauce through a colander. Bottle it, cork the bottles, and dip the tops into melted wax when they have cooled.

The juice and grated rind of a lemon may be added to the sauce just before it is strained.

Chilli Sauce

5 pints of chopped ripe tomatoes
1 cup of chopped red peppers
1 cup of chopped green peppers
¾ cup of chopped onions
½ cup of sugar
½ teaspoon of cinnamon
½ teaspoon of ground cloves
½ teaspoon of ground allspice
1½ tablespoons of salt
1½ cups of vinegar

Mix the chopped vegetables, salt, and sugar and simmer the mixture gently until it is thick. Add the vinegar and spices and continue to simmer it until it thickens, stirring constantly. Pour the sauce into hot, sterilised bottles, cork them, and when the sauce is cold dip the tops of the bottles into melted paraffin wax.

Tree Tomato Sauce

4lb. of tree tomatoes
1 large onion
1lb. of brown sugar
1lb. of apples
2oz. of salt
1oz. of black pepper
½oz. of allspice
1 dessertspoon of cayenne
½oz. of cloves
1 quart of vinegar

Wipe the tree tomatoes and apples, remove the stems, and cut the fruit coarsely. Peel the onion and slice it. Put them all into a saucepan with the sugar, salt, and cayenne and the spices tied in a muslin bag. Add the vinegar and bring the mixture to the boil, stirring constantly to prevent it sticking. Boil the mixture gently until it is soft and thick. Remove the bag of spices and strain the sauce through a colander. Pour it into hot, sterilised bottles, cork them, and when they are cold dip the tops into melted paraffin wax.

Relish Recipes

Tomato Relish

12 large tomatoes
4 large onions
Vinegar
1lb. of brown sugar
½ teaspoon of cayenne
1 dessertspoon of cornflour
1 dessertspoon of curry powder

Wipe the tomatoes, peel the onions, slice both into an enamel bowl, and cover them with brine. Leave them overnight, then drain them and put them into a saucepan. Cover them with vinegar and add the sugar and the cayenne. Boil the mixture for ¾ hour and thicken it with the cornflour and curry powder mixed to a paste with 2 tablespoons of vinegar. Put the relish into hot, sterilised jars and when it is cool cover it with melted paraffin wax. Cover the jars when they are cold.

Apple and Raisin Relish

4 large apples
2 sticks of rhubarb
½ cup of raisins
2 large onions
2 teaspoons of salt
1 pint of vinegar
¼ teaspoon of black pepper
¼ teaspoon of ground cloves
¼ teaspoon of ground ginger
¼ teaspoon of ground mixed spice
1½ cups of sugar

Boil the vinegar, salt, sugar, and spices to a syrup. Peel the onions and peel and core the apples. Wipe the rhubarb and mince it and the onions, apples, and raisins. Put these into the syrup and simmer the relish for 1 hour. Pour it into hot, sterilised jars and when it has cooled a little cover the tops with melted paraffin wax. Cover the jars when they are quite cold.

Mushroom Relish

Mushrooms
Salt and pepper
1 dessertspoon of cornflour
Pinch of mace
Pinch of ground ginger
Vinegar

RECIPES FOR RELISHES . . .

Peel and trim the mushrooms and cut large ones in halves. Put them into a saucepan and add salt and pepper to taste. Put the saucepan over slow heat and shake it gently until the juice begins to flow—5 to 10 minutes. Add the mace and ground ginger and sufficient vinegar to cover the mushrooms. Bring the mixture to the boil and simmer it gently for 5 minutes. Add the cornflour and 1 tablespoon of vinegar mixed to a paste. Simmer the relish until it is thick. Pack it into hot, sterilised jars and when it has cooled slightly cover it with melted paraffin wax. Cover the jars when the relish is cold.

Green Gooseberry Relish

2lb. of gooseberries
1lb. of onions
1 dessertspoon of black pepper
1 tablespoon of curry
1lb. of sugar
1 tablespoon of salt
1 tablespoon of ground ginger
3 pints of vinegar

Wipe the gooseberries and peel the onions. Mince the gooseberries and onions, put them into a saucepan with the rest of the ingredients, and boil the mixture gently until the onions are tender. If necessary, thicken the relish with a paste made from 2 tablespoons of flour. Pack the relish into hot, sterilised bottles and cover the tops with melted paraffin wax.

Tree Tomato Relish

2 dozen tree tomatoes
1lb. of onions
1 tablespoon of salt
1 teaspoon of cayenne
1 pint of malt vinegar
2lb. of brown sugar
1 teaspoon of peppercorns
1 teaspoon of cloves
1 teaspoon of allspice
1 teaspoon of chillies

Dip the tree tomatoes into hot water for a minute and then into cold water to loosen the skins, then peel and quarter them. Peel the onions and slice them coarsely. Put the tree tomatoes and onions in a saucepan and add the sugar, salt, cayenne, and vinegar and the spices tied in a muslin bag. Heat the mixture slowly to boiling point, stirring to prevent it sticking, and simmer it until it is thick. Pour it into hot, sterilised jars, cover the tops with melted paraffin wax, and tie the covers down when the bottles are cold.

If a red relish is desired, first add 2 or 3 slices of beetroot to white vinegar and bring it to the boil; cool it, and use the coloured vinegar instead of the malt vinegar.

Pear Relish

2lb. of pears
1lb. of brown sugar
1 teaspoon of cayenne
Pinch of cinnamon
1 teaspoon of ground cloves
½oz. of bruised root ginger, cut small
1 teaspoon of salt
Pinch of black pepper
1 medium-sized onion
1 pint of vinegar

Wipe the pears, core them, and cut them into quarters. Peel and slice the onions. Put the pears and onions into a saucepan and add all the other ingredients except the vinegar. Stir them over gentle heat until the sugar melts, then add the vinegar. Bring the mixture quickly to the boil, stirring to prevent it sticking, and simmer it gently until the onions are tender and the mixture is thick. Pack it into hot, sterilised jars and cover it with melted paraffin wax. When the relish is cold tie down the covers of the bottles.

Beetroot and Horse-radish Relish

4 cups of diced cooked beetroot
1 cup of grated horse-radish
1 tablespoon of salt
1 teaspoon of cayenne
4 cups of shredded raw cabbage
2 cups of sugar
½ teaspoon of black pepper
1 quart of vinegar

Place the beetroot and cabbage in an enamel bowl, cover them with brine, leave them overnight, then drain them thoroughly through a colander. Put the other ingredients into a saucepan, bring them to the boil, and boil them hard for 3 minutes. Add the beetroot and cabbage and boil the mixture for another 3 to 5 minutes—the longer time if the cabbage is to be soft. Pack the relish into hot, sterilised jars and cover it with melted paraffin wax. When they are cold cover the bottles and tie the covers down.

Celery and Tomato Relish

1lb. of tomatoes
1 large stick of celery
3 small onions or shallots
1 cup of sugar
1 cup of vinegar
1 teaspoon of allspice
1 teaspoon of cloves
½ teaspoon of salt

Wipe the tomatoes, wash the celery, and peel the onions. Mince the tomatoes, celery, and onions and place them in a saucepan. Add the sugar, salt, spices, and, last, the vinegar. Bring the mixture to the boil and simmer it until it is thick, stirring frequently to prevent sticking. Pack the relish into hot, sterilised jars and cover it with melted paraffin wax. When the jars are cold tie the covers down.

Cucumber Relish

1lb. of apples
2lb. of cucumbers
1lb. of onions
2oz. of salt
Juice and grated rind of 1 lemon
½lb. of sugar
1 teaspoon of cayenne pepper
1 teaspoon of ground cloves
1 pint of vinegar
½ teaspoon of ground cinnamon

Peel and core the apples, simmer them in the vinegar, to which the cloves, lemon rind, and cinnamon have been added, until they are soft, and allow them to cool. Peel the onions, wipe the cucumbers, and mince both. Strain off the juice, add the sugar, salt, and cayenne, and mix them thoroughly. Add the vinegar and apple mixture and reheat the two mixtures just to boiling point, stirring constantly to mix them. Pack the relish into hot, sterilised jars and cover it with melted paraffin wax. Tie the covers down when the jars are cold.

Pepper Relish

2 dozen red peppers
1 tablespoon of whole cloves
1 tablespoon of allspice
2 blades of mace
Piece of root ginger
6 cups of sugar
1 tablespoon of mustard seed
1 teaspoon of ground cinnamon

Split the peppers and remove the seeds and white fibre. Wash the peppers, soak them overnight in brine, then drain and mince them. Tie the spices in a muslin bag and put them into a saucepan. Add the vinegar and sugar and bring them to the boil. Add the peppers and simmer the relish for ½ hour. Pack it into hot, sterilised bottles and cover it with melted paraffin wax. When the relish is cold tie down the covers.

All photographs by Sparrow Industrial Pictures Ltd.

Tomato Soup which Does not Curdle

THERE are probably few New Zealanders who do not class cream of tomato soup among their favourites, and smooth, creamy, home-made tomato soup seasoned with parsley, celery, or onion is a tea or luncheon dish which always receives a warm welcome.

YET there are many New Zealanders who prefer not to risk making their own tomato soup from fresh or bottled fruit because it is difficult to prevent the soup from curdling. Some have overcome this difficulty by adding a pinch of baking soda to their sieved tomato pulp. This practice, however, destroys the nutritive value of the soup to some extent, the destruction of both vitamins B_1 and C being markedly increased.

The following method is simple and convenient, obviates the use of baking soda, and ensures a smooth, creamy soup the family will enjoy.

The usual family recipe for tomato soup can be used, provided that the sieved tomato pulp is thickened and added to the cold milk and then heated quickly to serving temperature, or the following recipe can be substituted.

2 cups of bottled or freshly cooked tomato pulp (This may have been cooked with onion or celery, seasoned after cooking with chopped parsley, or thinned with vegetable stock.)
2 tablespoons of flour
2 tablespoons of butter
Salt if required
2 cups of cold fresh milk

Melt the butter, stir in the flour, and then the tomato pulp, stirring until it has thickened and boiled. The mixture may be kept hot, if necessary. The milk may be measured into a bowl ready for the final stage. Five minutes before serving the soup, **pour the hot thickened pulp into the cold milk,** stirring the soup well. Heat the mixture quickly to serving temperature, stirring it meanwhile, and serve the soup in very hot plates or bowls; this will help to reduce the heating time.

Curdling may occur if the soup stands for too long before it is served, is heated too much or too long, or is made with milk on the verge of turning sour.

The precautions are: Add the thickened pulp to the cold milk only a moment or two before serving time, and heat the mixture quickly.

Keeping the thickened pulp hot for longer than is necessary will cause a gradual reduction in its vitamin value, as occurs when other vegetables are kept hot.

—EVELYN E. MOORE,
Rural Sociologist, Department of Agriculture, Palmerston North.

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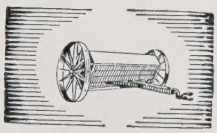

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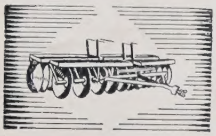

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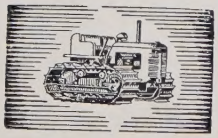

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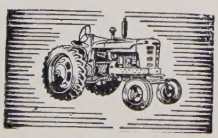

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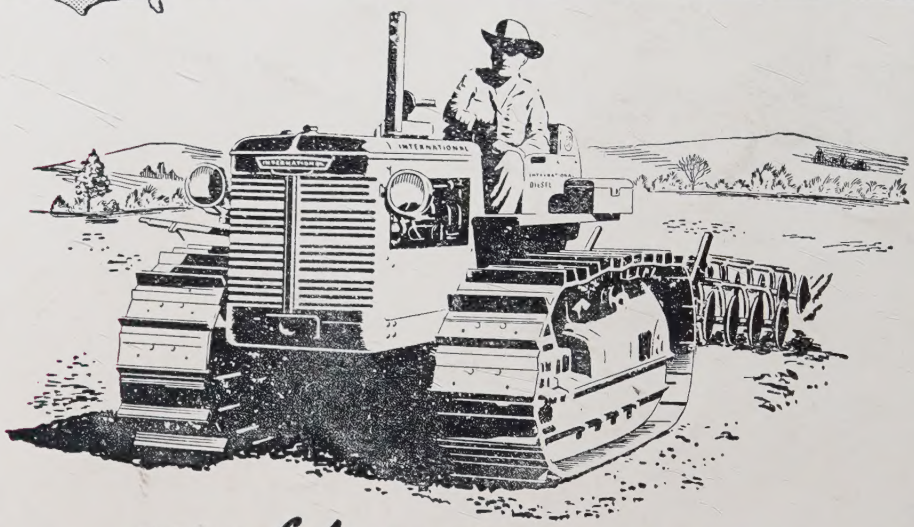

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